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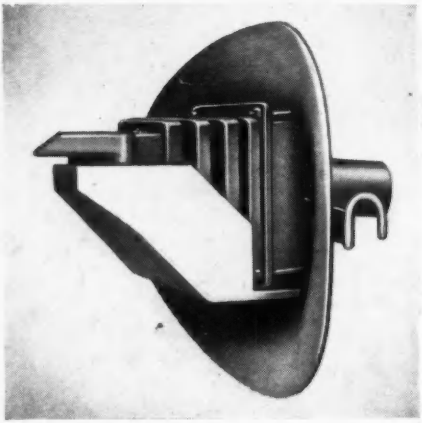

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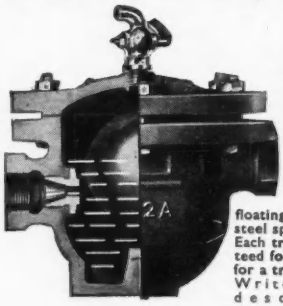

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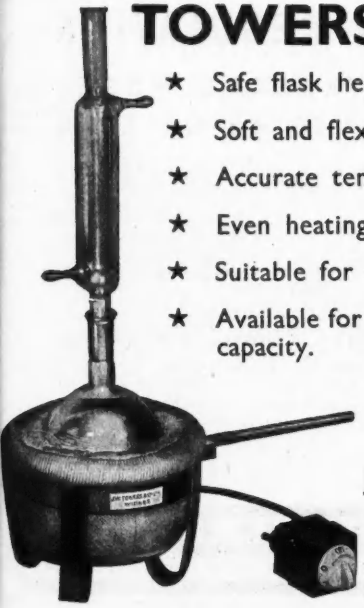

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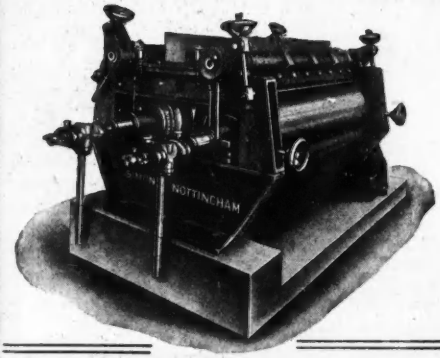

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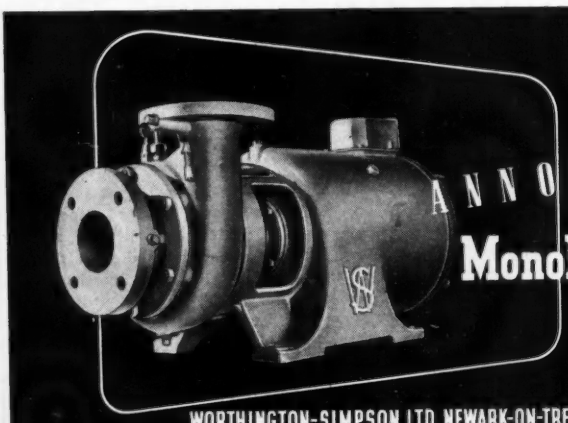

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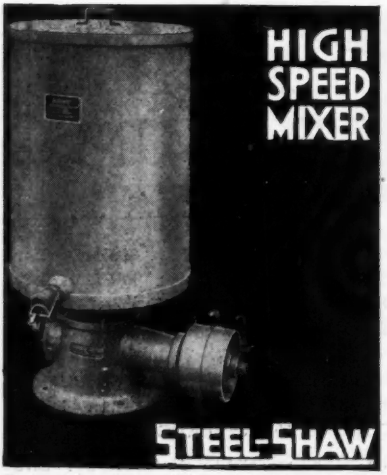

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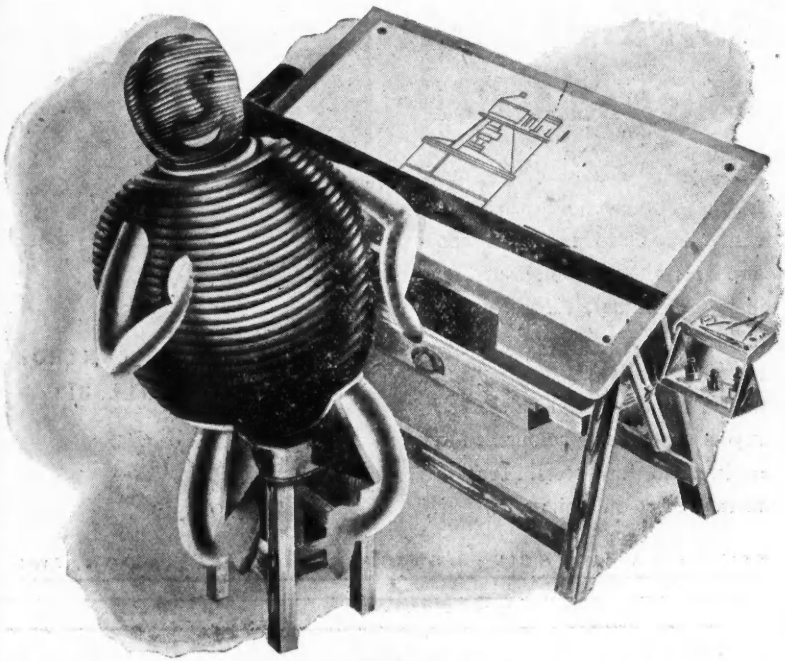

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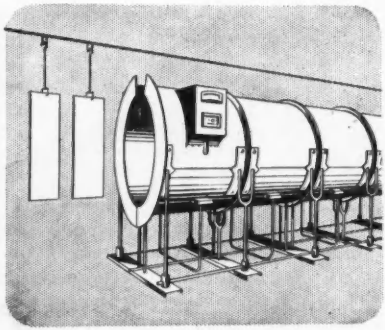

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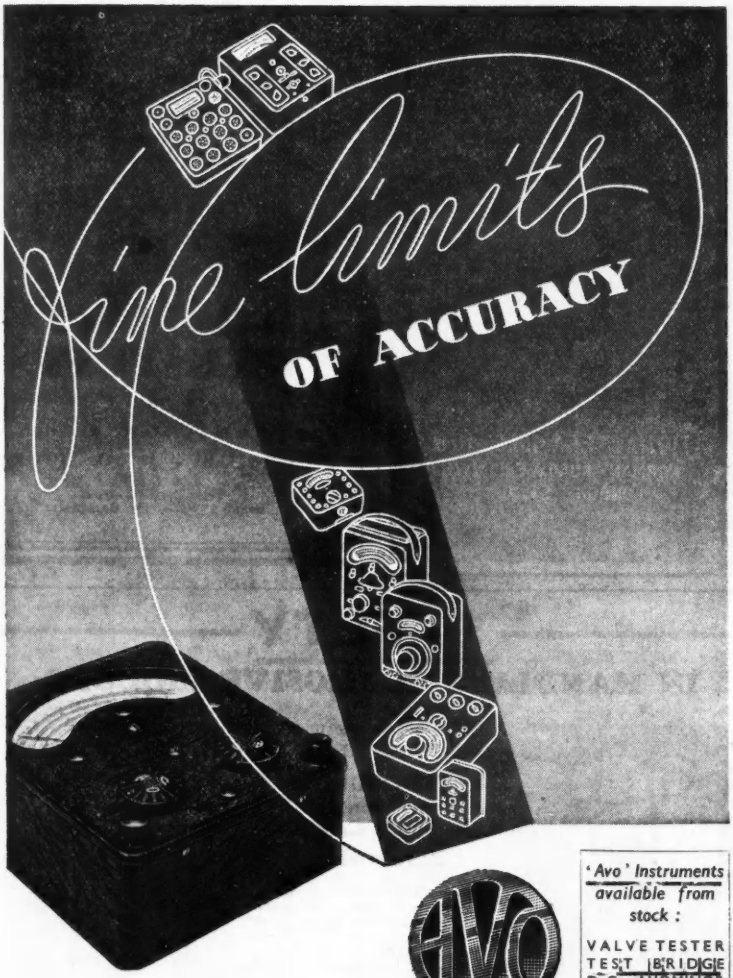

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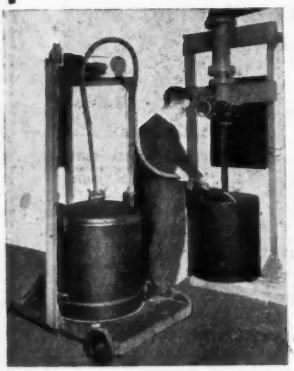

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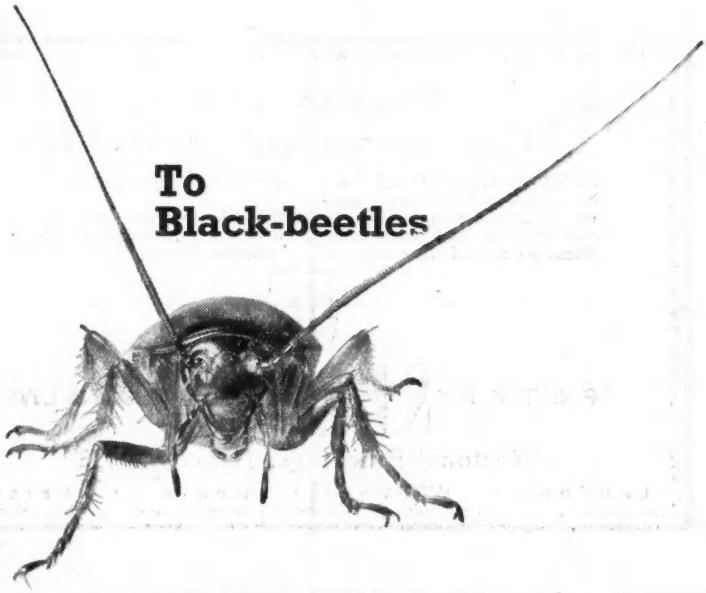

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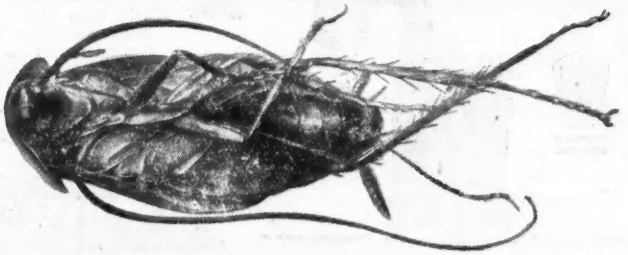

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Chemicals from Coal Carbonisation

THE paper prepared by Dr. John Campbell for gas technologists in Scotland, of which the last instalment appears on pp. 172-5 of this issue has fully illustrated the extraordinarily wide theoretical possibilities now before the carbonisation industry for the production of chemicals, and of chemicals required in ever-increasing quantities.

It is probably true that as any given chemical becomes available in greater quantity and at a reduced price use is found for it. There is, however, the difficulty of making a start, and that difficulty appears to have hampered developments in this country. It is all very well to declare that once a manufacturer has made a chemical available in large quantities the market for it will grow. That hope is not invariably borne out in practice. There is also the undoubted probability that a works representing very large capital investment will operate on a very small output for a considerable period while the demand is growing. Only a very wealthy corporation can lock up such large quantities of capital and incur very considerable running costs in salaries, etc., while waiting for commercial results. Somehow, affairs seem to have been differently arranged in America, but that was doubtless because there were there immensely wealthy corporations able from other manufactures to finance losses on pilot plants of considerable size.

The classic example of this is, of course, the petroleum industry. The great petroleum companies earned huge profits from their various petroleum products and they could afford to finance on a considerable scale the production of chemicals from natural gas or refinery gases and could even face with equanimity the complete loss of the capital invested in those projects. The result has been the start of an important chemical industry based on petroleum, rather in advance of the similar industry which is to be developed in this country.

The position is very different when coal products are under consideration. It may well be that the National Coal Board will be wealthy enough one day to finance projects for the production of chemicals from coal in a manner similar to that in which chemicals from petroleum have been financed in America. The National Coal Board cannot yet be expected to do this while its energies and capital are fully engaged in developing the production of coal by modern methods. With the impending nationalisation of the gas industry the opportunity for private enterprise to put into effect the chemcal processes discussed by Dr. Campbell seems to have receded, and future developments may have to depend entirely upon the policy of one or two national boards owning the carbonisation industry of the country. The new development in Britain is capable of frustrating for years to come the establishment of a chemical industry based on coal carbonisation. All depends on the enterprise, initiative and vision of those at the head of the national boards.

Meanwhile, the groundwork for such an industry has been well explored in the

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several papers during the last few years describing the chemical reactions which could be used to produce chemicals from coal gas or from other products of carbonisation. The chemistry of the transformation of methane, ethane, ethylene and acetylene is now fairly familiar territory. What is required now is information upon the costs of production, such as a group of chemical engineers in collaboration could certainly provide. Even this, however, is only one step. We require also an authoritative estimate of the possibilities of expansion in the use of these products and of the price at which they must be produced if further use is to be stimulated.

It is doubtful, of course, how far the gas industry or the coke-oven industry could afford to strip their gas of its more valuable constituents. Dr. van Aken in his paper to the World Power Conference suggested that the gas industry should to a very large extent be linked with the chemical industry so that the gases derived from carbonisation would be first subjected to treatment to produce more valuable substances from their constituents and that the residual gases, including those from these syntheses, should then be distributed for town purposes. It may be that this would be an economic procedure if the profits on the chemical phase of the undertaking were sufficiently large. It seems likely, however, that it would lead to a rather curious mixture of gases having no constant combustion characteristics, and that it might therefore upset the fundamentals of town gas production and utilisation.

It does not follow by any means that because a constituent is present in coal gas and can be extracted from it that it would at once be economically possible to do so, having regard both to the cost of the extraction operation and to the effect of that operation upon the gas industry. At the moment, the gas industry is obviously supplying more imperative needs of domestic consumers and of industry itself than the chemical products could do. That is a truism sometimes overlooked by chemists theoretically applying laboratory reactions to practical production. Ethylene, however, is one constituent likely to be of immediate practical value.

There is one more possible source of chemicals from coal or coke the prospects of which do not depend on nationalised industries. The Gas Research Board has virtually completed its work on the production of methane by synthetic methods. The chairman of the Board has stated that the process, having been developed to the pilot plant stage is now left for others to develop. Dr. Campbell has referred to this process and has shown various ways in which methane could be utilised. There is only one deterrent to private firms making use of this synthetic process to manufacture methane, from which in turn all the chemicals described by Dr. Campbell could be manufactured on a huge scale. That is the absence of any authoritative costing of producing methane in this way, or of the cost of producing from methane the chemicals mentioned.

NOTES AND COMMENTS

Export Stocktaking

PRODUCTS of the United Kingdom chemical plants made a useful contribution in December towards the reduction of the continuing hiatus between import and export totals. Chemical sales, without taking into account the increasingly important trade in drugs and dyestuffs, were worth the equivalent in foreign currency of more than £3.195 million, some £324,000 better than in the previous month. By this eleventh hour recovery the year's total of chemical sales was brought to £36.572 million, not quite £3 million less than in 1946—in which there was no fuel crisis. The December total is remarkable inasmuch as the record of the month furnished in the current *Trade and Navigation Accounts of the United Kingdom* indicates that in almost every instance bulk totals of individual chemical exports were less than in November. In that respect the monthly summary conclusively reveals the continuing increase in world chemical values and, by inference, the fact that the pressing post-war demand is still inadequately supplied with most of the basic chemicals. While the end of the "sellers' market" may well be at hand, there is clearly abundant scope at the moment for everything that more generous supplies of fuel and raw materials for chemical industries could produce.

Potential Dollar Earnings

TYPICAL of the wide range of basic chemicals for which in the past world demand was supplied largely by this country is the group of commercial sodium compounds—soda, carbonate and soda ash—for which no adequate alternative sources of supply have yet become available. All the hard currency markets, not excluding the U.S.A., are potential buyers of every additional ton that could be shipped and the stimulus which more generous supplies here would provide in one of the widest fields of production is evident. Largely because fuel supplies brought the sodium production plants almost to a standstill in the opening months of the year, and even now are not on a sufficiently generous scale, the year's output of this group was reduced in value to £1.138 million, against the £1.528 million sold in 1946, and the falling off was again evidenced by December's total of 218,419 cwt., some 29,000 cwt. less than in November. Fortunately, one at least of the important sodium group —caustic—has helped very materially to redress the balance, shippng some 219,000 cwt. (value, £263,000) in December against 169,000 cwt. a month before. Very largely increased trade with Brazil and India accounted for much of this increase. In present conditions, however, most of the credit belongs to those who raised production to the higher level. Here again filling order books still seems to be very much simpler than filling orders.

Incentives

GOOD management in industry is as important in Britain's current economic struggle as were the Hurricane and Spitfire in 1941. That picturesque presentation of the subject was Col. L. Urwick's, whose recent exposition to the Oil and Colour Chemists' Association of the functions of scientific management in the present economic emergency was one of the most lucid contributions on the subject that have yet been offered. By comparison with its realism and insight most recent exhortations by Government spokesmen seem more than ever conspicuously bereft of inspiration. Particularly worthy of record is Col. Urwick's thesis, of the truth of which most have had evidence in the course of war service and the classic experiments by Harvard scientists at the Western Electric Company fully confirmed—of the exaggerated value attributed to purely financial incentives and the undervaluation of the social aspect of factory or equivalent work. Almost every study of industrial output and labour relations seems to have overlooked, or refused to admit, the importance of the little workers' groups which form as infallibly as do given products of a chemical reaction, seven or ten individuals who develop a social structure of their own which goes far in determining the activities of them all. They issue no slogans and postulate no policy, collective or otherwise, and no appeals are directly addressed to them. Yet in the aggregate they are the final arbiters of the country's economic success or failure. If we cannot bring back into

the factories the leadership to which such units will rally, says Col. Urwick, we cannot get production out of them. The mere fact that the phrase "the men's leaders" has come to mean trades union officials is the measure of our failure since the industrial revolution.

Specialists and Administrators

COL. URWICK'S forthright presentation of affairs in labour administration, including the inevitability of increasing participation in and control by the State of economic affairs and the accompanying threat of chronic bureaucracy, had several direct references to chemical industry, notwithstanding the relatively unruffled labour-management relations prevailing here. And of particular interest was his commentary on another aspect of the same theme—the lack of incentive to chemists aspiring to the higher ranks of management. There is, he agreed, for most chemists and scientists an impalpable but unbridged gulf separating them from managing directorship. Science and administration, he concludes, are uneasy partners and are likely to remain so. Yet the really first-class specialist is still "worth infinitely more than the administrator."

Rising Steel Prices

THE effect of a Ministry of Supply Order which came into force on Wednesday is to increase the prices of most iron and steel products. The new Control of Iron and Steel Order (No. 62) and the Control of Bolts, Nuts etc., Order (No. 15) implement the second price rise since October last in iron and steel products, and, as regards steel, effect changes in the Form M authorisation system aimed at a closer control of existing resources. The new price scales apply, for example, increases of 5s. per ton for billets, blooms and slabs to 7s. 6d. per ton for wire products and 9s. per ton for pig-iron. These are substantially smaller than the last increases and, like them, serve merely to offset the latest rise imposed by the collieries. It is not necessarily the last word in the continuing process, the inevitable effect of which is to place a further charge on the costs of nearly all United Kingdom manufactured products.

B.I.F., 1948

Facilities for Overseas Buyers

A BOARD of Trade announcement this week indicates that with the exception of the Pottery and Glassware Section (to be housed this year at Earl's Court) all trade groups of the next B.I.F. will be located in their familiar places at Olympia, Earl's Court or Castle Bromwich.

Among concessions that have been arranged for overseas buyers are the following:

Visas for the United Kingdom, for which a charge is normally made, will be obtainable free upon application to the nearest consular officer.

There will be a free coach service to carry visitors between Earls Court and Olympia.

Extra trains will be provided between Euston and Castle Bromwich, and during the Fair, all Birmingham main-line trains will call at Castle Bromwich.

An air-taxi service is expected to operate between London and Castle Bromwich.

Visitors who intend to use cars will be enabled to obtain petrol allowances upon compliance with certain requirements.

There will be inquiry bureaux and interpreters at Euston and Paddington stations and at New Street and Snow Hill stations in Birmingham.

Coal Nationalisation

Conflict Between Politics and Business

SPEAKING at the adjourned annual general meeting in London of Amalgamated Anthracite Collieries, Ltd., Mr. F. A. Szarvasy, the chairman, said the National Coal Board had a hard and most thankless task, and the very disappointing results of nationalisation of the industry could not be laid at its door. The grossly inflated hopes created by insidious Socialist propaganda were to blame.

In fulfilling some of the wild promises—increased miners' wages, shorter hours, etc.—said Mr. Szarvasy, coal had become scarce and no longer competitive in world markets.

"As long as politics are allowed to play into business matters," he continued, "and jobs are found, for obscure reasons, for inefficient people, I doubt whether this all-important and vital industry can take its proper share in helping national revival and prosperity."

Italian Sulphur for France.—A recently-concluded agreement provides for the export of some 30,000 tons of Italian sulphur to France.

RADIOACTIVE EFFLUENTS

Full Agreement on Safeguards at Harwell

THOROUGH precautions are being taken —states the Ministry of Supply—to ensure that the Thames water used at the Atomic Energy Research Establishment at Harwell is returned to the river free from risk of harmful radioactivity.

These precautions are being adopted after close consultation between the Ministry's experts and experts of the Ministry of Health, the Metropolitan Water Board and the Thames Conservancy, and on the advice of the Medical Research Council's Research Committee on the Medical and Biological Applications of Nuclear Physics.

A certain amount of radioactivity in drinking water can be tolerated by human beings, and the tolerance laid down by the Medical Research Council for the Thames water is such that the medical and biological effects due to the consumption of water during the life span of human beings would be for all practical purposes negligible.

Million Gallons Daily

Roughly one million gallons of water a day will be involved. The greater part will be used for the cooling of plant and ordinary domestic requirements at the establishment. The remainder of the water will be used for research processes, some of them radioactive, and a carefully controlled separate water system will be installed to deal with it. The most highly active portion will be segregated and will not be returned to the river. The rest of the water will be delivered to storage tanks where it will be tested by Medical Officers for compliance with the agreed tolerances, treated for chemical impurities and then mixed with the domestic waste water before being discharged into the pipe which takes it back to the Thames at Sutton Courtenay.

The system of treatment and examination has been designed so that several operations have to be carried out before the water actually passes into the six-mile discharge pipe. Moreover, a new weir is being constructed at the point of discharge into the Thames, and the Harwell water will thus be turbulently mixed with much greater quantities of river water immediately it joins the main stream.

Full Collaboration

These safeguards have received the approval of the Ministry of Health. The Thames Conservancy has decided to raise no objection to the proposals, in view of the safeguards agreed to be adopted and having regard to the assurances they have received from the Ministries concerned.

By arrangement with the Ministry of Supply, the Thames Conservancy will be able to have samples taken at regular intervals for test purposes. The Ministry of Supply, is providing facilities for testing samples taken at a small riverside laboratory where Ministry scientists will themselves take sample tests and assist the Thames Conservancy in theirs.

Planned Disposal of Factory Wastes

American Chemists' Association Outlines a Programme

AS a part of a long-range programme to combat pollution of United States waterways, the Manufacturing Chemists' Association has just issued a manual to guide plant managements in setting up company organisations to handle problems of industrial waste disposal. Water pollution affects "practically every town and industry" in America, the publication declares. Raw sewage from 47 to 60 million persons is being dumped into streams, while industrial waste discharged without treatment adds organic pollution equivalent to the sewage from 55 to 60 million additional persons. The manual is being distributed to some 200 manufacturers, more than half of which are chemical companies.

Basic Needs

Step-by-step procedures are laid down for determining the extent to which factory control measures may need to be instituted and for organising waste disposal supervision within companies. It recommends that waste disposal be brought into the laboratory and made a part of the research that develops new products. In building a new plant, or enlarging an existing one, the publication urges consideration of the following:—

1. The condition and flow of receiving water.
2. Local pollution control requirements.
3. Whether acceptable conditions can be obtained by a reasonable expenditure on waste recovery and treatment equipment when compared with other factors concerning the site.
4. Whether available diluting water

(*Continued on page* 166).

The Scientist in Industry

Highest Rewards Seldom Available to Chemists

THE relative discrepancy between the rewards available to scientists and technologists and those enjoyed by those who chose administration was one of the topics dealt with by Col. L. Urwick in the course of a penetrating study before the Oil and Colour Chemists' Association of "Scientific Management." Mr. H. L. Howard, raising this point, asked "where the break occurred" when chemists aspired to the higher ranges of management, and how they could adjust themselves.

One of the puzzles of our day, said Col. Urwick, was that we needed more and more highly trained, highly specialised professional men at the lower levels. Some proportion of those men would go on to the higher professional level. One of the matters not yet attended to sufficiently was that of equalising out the rewards offered to really crack research engineers or chemists, and so on, as compared with the rewards offered to managing directors.

Deliberate Choice

He believed that younger men should be encouraged, at about 28/32 years of age, to make a clear personal decision as to which way they wished their future to lie. And it was the duty of a managing director to chat with them individually at about that time as to the sort of future they really envisaged for themselves. If they wished to become administrators they must recognise that they were going to adopt a new profession, having a different technique from that of a high grade specialist. At the same time, we needed specialists, and he believed the really first-class specialist was worth infinitely more than the administrator.

One thing, however, which was to be especially avoided was to allow a specialist to drift into being an administrator, without any preparation for it, without the opportunity to re-educate himself in the new techniques he would have to use or any clear decision in his mind as to what was happening to him. The helping of people to think out their own lives and to be quite deliberate about what they were doing was more than half the battle.

Deficiencies in Whitehall

Replying to Mr. H. M. Eade, Col. Urwick suggested that a very good plan, where a young scientifically-trained man was likely to develop into an administrator, was to give him one or two administrative problems to which he could apply his scientific mind; after that he might be given a little training in the technique of management.

Meanwhile, the conspicuous lack of scientific management at the Whitehall level was leading a great many of our factories into the most appalling difficulties. One of the worst effects was the reaction on the man who was really trying to put his back into the export drive. The only answer was to ensure that scientific management reached the Whitehall level. He admitted that it was difficult, but he urged that it was not impossible.

INDUSTRIAL SELF-GOVERNMENT

ADDRESSING members of the Caterers' Association at Olympia last week, on the responsibilities of industrial negotiations under current national conditions, Sir Godfrey Ince, Permanent Secretary to the Ministry of Labour, said:

"If an industry is to continue to have self-government in this matter of wages and conditions it must have regard not only to the welfare of itself but to the well-being of the whole national and economic structure of the country of which it forms part."

Those concerned in industrial negotiations of any kind, he said, must consider the economic consequences of anything they proposed to do.

NATIONAL ARBITRATION APPOINTMENT

THE Ministry of Labour has appointed Dr. W. H. Garrett, director of Production of Monsanto Chemicals, Ltd., to the panel chosen to represent employers on the National Arbitration Tribunal. Dr. Garrett, who joined Monsanto's Ruabon works as a laboratory assistant in 1917, is vice-chairman of the Association of Chemical and Allied Employers, and vice-chairman of the Chemical Trade Joint Industrial Council. In 1929 he was appointed assistant works manager at Ruabon, and a year later, became works manager. He joined the Monsanto board in 1935 as works director. When Monsanto was reorganised at the beginning of last year Dr. Garrett became director of production for all the company's plants in Great Britain.

New Monsanto Section

London Engineering Department Formed

MR. E. A. O'Neal, managing director of Monsanto Chemicals, Ltd., has announced the formation of a Central Engineering Department, to be located in London. The duties of the new department, under Mr. W. M. Cooper, as manager of engineering, will be assigned to four divisions: chemical engineering; mechanical engineering; civil engineering; construction engineering.

Head of the chemical engineering division will be Mr. M. Buis, B.Sc. (Delft), and, operating a section at Ruabon as assistant chief chemical engineer will be Mr. J. A. Gardner, Ph.D., A.R.C.S., A.R.I.C. D.I.C. Mr. O. W. Murray, M.A (Camb.), M.I.Mech.E., M.I.Chem.E., will be chief mechanical engineer, and the chief civil engineer will be Mr. R. Adams, B.Sc., A.M.I.Mech.E., A.M.I.Chem.E., F.I.A.A.

Mr. J. M. Kershaw, BSc., F.R.I.C., A.M.I.Chem.E., assistant to the manager of engineering, will, in the meantime, continue to act as chief construction engineer at Newport where Monsanto is building a new plant which will occupy a 125-acre site.

Industrial Relations Officer

Mr. S. E. Chaloner, M.Sc., has been appointed Industrial Relations Officer of Monsanto Chemicals, Ltd. He will operate from London. Mr. Chaloner joined Monsanto in 1925 and during his 23 years at their Ruabon works he has had wide experience of personnel management, production, and at the beginning of his career, of research. His appointment as personnel manager at Ruabon at the beginning of last year was preceded by six years as superintendent of services.

B. LAPORTE CAPITAL CHANGES

IN association with the proposed change of name of B. Laporte, Ltd., to Laporte Chemicals, Ltd., the company is to call an extraordinary general meeting at Luton on February 16, for the additional purpose of considering proposals for sub-dividing issued and unissued ordinary stock (at present transferable in amounts and multiples of £1) into amounts and multiples of 5s. By this means, says the company's statement to stockholders, it is hoped to widen the market for the ordinary stock "by bringing it more readily within the reach of investors of modest means."

The directors will also propose to raise additional capital to meet growing obligations incurred in connection with extension of the manufacturing resources of the company and its subsidiaries.

Amber Chemicals

Formation of New Company Announced

INCORPORATED as a public company on January 9, Amber Chemical Industries, Ltd., has been formed to acquire the whole of the issued capital of The Amber Chemical Co., Ltd., which controls a group of chemical and allied industries, and which for over 40 years has been associated with the manufacture of papermakers' chemicals.

The companies of the group, which are wholly owned subsidiaries or sub-subsidiaries are as follows:—

The Amber Chemical Co., Ltd., London and Wolverhampton (incorporated in 1906: issued capital 21,700 £1 ordinary shares).

Chemi-Synthetics, Ltd. (incorporated in 1940: issued capital 10,000 £1 ordinary shares).

T. H. Walton & Co., Ltd. (incorporated in 1906: issued capital 2000 £1 ordinary shares).

Kempac, Ltd. (incorporated in 1932: issued capital 100 £1 ordinary shares).

The Vialit Co., Ltd. (incorporated in 1931: issued capital 25,000 £1 ordinary shares).

C. G. Fox & Co., Ltd., Wolverhampton (incorporated in 1935: issued capital 1500 £1 ordinary shares).

The group's products are principally industrial, fine and pharmaceutical chemicals, and include waterproofers and other finishing materials particularly for silks, silk stockings and rayon, bituminous emulsions, cutting oils, disinfectants and essences, salts and derivatives of barbituric acid, hypnotics and sedatives.

Properties of the company, which include wharves and other riverside facilities, factories, and considerable plant and laboratory equipment in London, Batley and Wolverhampton, have been valued at £173,208.

Group profits over the last ten years show steadily increasing advances. The 1946 figure of £79,731 is estimated to have been surpassed during 1947, and is believed to be in the neighbourhood of £85,000.

The directors are as follows: Mr. Eric Loufwin Ford (director of National Benzole, Ltd.) (chairman); Mr. John Russell (managing director); Mr. Peter A. C. K. Bruckmann (director of The Amber Chemical Co., Ltd.); Mr. Arthur W. Edwards (pharmacist).

Drift Mines at Burnley.—Plans drawn up by the north-western division of the National Coal Board for the production of coal from drift mines at Burnley and Wigan (two are already in operation) will ultimately yield a million tons. Chief advantages are in almost immediate production, and in economy of man-power.

N. Ireland Research Council

New Source of Information for Industrial Development

AN industrial research council has been set up in Northern Ireland by the N.I. Ministry of Commerce. Its duties will be to advise on efficient utilisation and development of Ulster's natural resources, to increase application by industry of research results aiming to increase processing efficiency, development of new methods of production and expansion of existing ones. In conjunction with the Director of Scientific Development, it will also arrange for research specially calculated to increase the industrial or commercial interests of Northern Ireland.

In Isolation

In augurating the new Council in Belfast, the Rt. Hon. Sir Roland Nugent, Minister of Commerce, explained to the consulting members that industrial problems in the Province are conditioned by its geographical isolation in reference to the rest of the United Kingdom and that the practical application of research is essential to-day, in view of war effects and the impact of ever-increasing competition in home and export markets. The natural resources of the Province should be further investigated and developed, and having regard to present upward price trends and necessity of reducing imports, there is strong prospect of favourable economic development. The Minister instanced the case of fuel; native peat suitably processed is likely to compete successfully on a price basis with coal.

Great importance is attached to industrial expansion by results from discoveries of applied science, especially in new industries calculated to balance the Northern Ireland industrial output, these industries are specially dependent on prompt application of research.

Primarily, however, the Council will be required to obtain and classify information from technical organisations within Britain and to make it available to Ulster industrialists. The only organisations functioning at present with Government financial assistance in Northern Nreland are the Linen Research Institute and the Agricultural Research Organisation.

The present position, as outlined by Sir Roland Nugent, is that apart from textiles, ropemaking and shipbuilding, industries of Northern Ireland, ranging from fertilisers to ceramics, have been built up over a long period and tend to retain outmoded processes. Owing to the difficulty of securing specific research and modern process information regionally, the immediate proposal is to assemble a cogent, representative collection of technical literature for the benefit of Ulster industry and to arrange "contacts" through the Director of Scientific Development, the present facilities being definitely inadequate.

The numerous smaller Northern Ireland concerns usually fail to appoint personnel whose duty it is to keep in touch with technical advance and at present there is no official facility for such industrial plants to procure specific information from the D.S.I.R. Research organisations. Therefore, it is considered important that a liaison should be built up to provide information, to make frequent visits, and to advise where new research should be initiated for the assistance and development of industry within the Province.

The chairman of the new Scientific Council, whose headquarters are at the Ministry of Commerce, Belfast, is Sir David Lindsay Kier, M.A., LL.D.

DISPOSAL OF FACTORY WASTES

(*Contd. from page* 163).

would limit the size of a plant at the location under consideration.

5. Preparation, on the basis of preliminary agreements with local control authority, of complete plans to meet requirements for disposal of sanitary sewage and industrial waste.

6. Preparation of a description of control facilities, including information on requirements that must be met at a new location, so that personnel later charged with the responsibility for operating the plant will understand the factors involved in the disposal of waste.

Where plants have been put into operation without adequate consideration of waste handling, the manual recommends institution of a study programme. It sets forth a number of conditions which, it states, must be met if the programme is to be successful with a minimum investment in treating equipment. They include: The selection of a graduate chemist or chemical engineer to supervise the work with an adequate number of trained assistants. The provision of facilities for continuous analyses of plant wastes. The provision of facilities for obtaining samples from the main plant sewer, from individual sewers and from the stream into which wastes are discharged. Ideas and suggestions should be solicited for reducing waste, and funds should be provided to try laboratory or small-scale tests of recovery methods.

U.K. TRADE IN DECEMBER

Substantial Improvement in Value of Chemicals

THE value of all U.K. exports for December at £110.2 million, was £7.9 million more than in November, and only £50,000 below the peak figure in July.

Allowing for the rise in prices since 1938, the export volume is provisionally estimated to have been 120 per cent of 1938, as against 112 per cent in November, 120 per cent in October and 126 per cent in July. The daily rate of exports just exceeded that in July and is the highest so far recorded.

Exports of machinery in December reached the record total of £17.7 million, but three important groups, vehicles, chemicals, drugs, etc., and miscellaneous manufactures showed reductions compared with both July and October.

The overall increase in chemical exports, compared with November—to £3.195 million—was aided by the rises in sodium carbonate (218,419 cwt., as against 194,348) and caustic soda (219,793 cwt. as against 146,102). Compared with December, 1946, the total value of chemical exports rose £555,000.

With regard to imports (all commodities), those for December at £153.4 million, though £15.2 million higher than November, were otherwise the lowest since May. Imported chemicals showed general decreases in December compared with November, the exception being potassium chloride, of which 525,058 cwt. arrived in December compared with 518,530 in November.

Individual export and import totals were as follows :—

CHEMICAL EXPORTS

	Dec. 1946	Dec. 1947
	Cwt.	Cwt.
Citric acid	1,179	460
Formic acid	3,268	2,826
Tartaric acid	403	1,132
	Tons	Tons
Aluminium oxide	36	20
Sulphate of alumina	1,910	1,703
Ammonium sulphate	12,010	16,381
Ammonium nitrate	8,827	9,855
	Cwt.	Cwt.
Bleaching powder	34,230	25,015
Calcium carbide	4,926	1,704
	Gals.	Gals.
Benzol	29,255	544
Cresylic acid	150,368	167,583
Tar oil, creosote, anthracene oil, etc.	264,348	2,508,434
	Cwt.	Cwt.
Napthalene	4,253	1,243
Nitrocellulose	2,106	863
Disinfectants, insecticides, weed-killer, etc.	85,326	56,619
	Tons	Tons
Copper sulphate	968	657
	Cwt.	Cwt.
Glycerine	7,137	187
Nickel salts	1,810	3,851
Lead acetate, litharge, red lead, etc.	8,415	1,904
Magnesium compounds	Tons 661	Tons 790
	Cwt.	Cwt.
Potasium compounds	7,903	11,351
	Tons	Tons
Salt	12,658	10,384
	Cwt.	Cwt.
Sodium carbonate	247,178	218,419
Caustic soda	169,751	219,793
Chromate and bichromate of soda	1,281	100
Synthetic sodium nitrate	299	—
Sodium silicate	21,134	9,987
Sodium sulphate	34,337	19,038
Total value of chemical manufactures, excluding drugs and dyestuffs	£2,640,037	£3,195,667
	Oz.	Oz.
Quinine and quinine salts	105,721	88,523
	Mega units	Mega units
Penicillin	—	148,817
	lb.	lb.
Acetyl-salicylic acid	78,642	112,173
Total value of drugs, medicines and preparations	£1,363,858	£1,220,881
Total value of dyes and dyestuffs	£557,931	£653,535

CHEMICAL IMPORTS

	Dec. 1946	Dec. 1947
	Cwt.	Cwt.
Acetic acid	5,239	13,315
Boric acid	2,500	7,003
Tartaric acid	3,680	—
Borax	25,500	28,400
Bromine and bromides	485	776
Calcium carbide	—	12,665
Coal-tar products, excluding benzol and cresylic acid	1,511	5,837
	Tons	Tons
Ammonium phosphate	1,786	—
Manufactured fertilisers	30,194	32,278
	Cwt.	Cwt.
Potassium chloride	393,894	525,058
Potassium nitrate	—	500
Potassium sulphate	39,910	25,762
Sodium nitrate	—	—
Carbon blacks	96,109	34,879
Total value of chemicals, drugs, dyes and colours	£1,707,530	£2,203,349

POLISH CHEMICAL TOTALS

OUTPUT of the most important products from the Polish chemical industry (in tons) during November was as follows :—Hydrochloric acid 378, acetylene 2426.6, crude soda 13,170, Glauber's salt 709, potassium bichromate 56.4, red lead and litharge 186.7, ultramarine 48.2, superphosphates 18,404.4, potassium nitrate 10,894.6, saltpetre fertilisers 4734.9, ammonia 522.8, sulphuric acid 5693, benzene products 2810, carbon electrodes 470.8, explosives and powder 1234.3, acetone 13.9, nitrate compounds 211, sulphate compounds 58, naphthalene 35, pharmaceutical products 42.7, soap 820, glycerine 11, oil paints and varnishes 287, zinc oxide 751.6.

All figures are in excess of the target for November. Persons employed totalled 45,490.

Canadian Chemical Expansion

More Basic Chemicals

THE chemical industry in Canada has embarked on a plant expansion programme that exceeds the scope of any peacetime development in the last 25 years. Mr. George W. Huggett, president and managing director, Canadian Industries, Ltd., estimates total Dominion chemical plant construction in 1946-47 at $46 million, equivalent to 53 per cent of the value, after depreciation, of the industry's production facilities in 1939. New production facilities have been completed or are under construction for such projects as caustic soda and chlorine plants at Arvida and Beauharnois as well as units being built by paper companies; an extension of the Amherstburg soda ash works; a plant for making ethyl alcohol from sulphite liquor at Gatineau, Quebec. Other projects include a phenol formaldehyde resin works at Belleville; plants for making monochloracetic acid at Shawinigan Falls and a zinc oxide plant at Cap de La Madeleine.

* * *

Financial reports from the Dominion indicate that a substantially greater tonnage of chemical products are to be produced in Canada, and a correspondingly greater proportion of home market demands met by the Canadian industry. This may result from (a) increased demand for basic chemicals for use in manufacture of end, and consumer, products; and (b) the coming into production this year of certain chemicals which had either not previously been made, or which were produced only on a small scale. Most important examples are: Production of ethylene-glycol stated to begin at Dow Chemical's Sarnia plant early this year, sharply increased production of chlorine by new plants, and larger tonnage of basic plastic materials for use in a broad range of plastic end products. The cost of further increases in wages or raw materials will be passed on to the consumer, it is stated; the new import tariffs, it is thought, will produce only negligible effects.

* * *

The coal-tar distillation industry of Canada in 1946 recorded a turnover valued at $5,509,727 compared with $5,616,313 in the preceding year, a decrease of 1.9 per cent, according to the Dominion Bureau of Statistics. Chief products of the industry were creosote and other tar oils, refined tar, pitch, tarred felts and sheetings, pitch coke, protective paints, phenol, cresols and cresylic acid.

Jugoslavia to Supply Mercury?

Possible Reduction of World Prices

CONSIDERABLE interest in international mercury trade circles attaches to the recent arrival in New York of a first shipment of 1500 flasks of mercury from Jugoslavia. The mercury had been mined in the former Italian mercury mines at Idria, but which now belong to Jugoslavia under the terms of the Paris Peace Treaty. Special anxiety is reported to have been caused to the Italo-Spanish mercury cartel "Mercurio Europeo" (which formerly virtually controlled the deposits), because mercury mined in Jugoslavia had not hitherto been offered for sale on the world market. In fact, it had been taken for granted that Idria mercury would be sent exclusively to the Soviet Union and her Balkan neighbours.

Competitive Position Changed

The appearance of Jugoslavia on the international mercury market changes the competitive position and might force the Italo-Spanish cartel to revise its price policy. It may be recalled that its prices were lowered during 1947 in order to eliminate the high-cost Mexican and Canadian competition established during the war. Since Jugoslavia has been able to secure a quite substantial initial U.S. order from the U.S., it is assumed that her quotations were below those of the Mercurio Europeo.

RAYON COMPANIES' AGREEMENT

FRENCH Tubize (rayon company) is to call an extraordinary meeting on February 18 to approve agreements reached with the Dreyfus-Clavel group, British Celanese, Ltd., and the Belgian Tubize company, which will provide for the termination of the relations existing since the creation of the French company.

It is proposed that lawsuits which have been in progress for many years between the French company and British Celanese and the Dreyfus group should be withdrawn. The new agreement provides for the cancellation of the 25,000 French Tubize "B" shares of 100 francs nominal (out of a total of 50,000) which had been handed over to the Dreyfus-Clavel group at the foundation of the company in payment for patent rights.

POLYMERISATION OF ACETYLENE

First Comprehensive Study of I.G. Farben Discovery

THE polymerisation of acetylene in a solution of tetrahydrofurane over nickel salt catalysts to produce cyclooctatetraene (COT) and homologues was a new development carried out experimentally between 1940-1944 at the I.G. Farbenindustrie, Ludwigshafen plant. The process is the subject of a full-scale study by Walter J. Kammermeyer, director of chemical reseach, Publicker Industries, Inc., Philadelphia, Pa., states in a comprehensive account of the polymerisation of acetylene to cyclooctatetraene as worked out during the war by J. Walter Reppe, director of organic research for I.G. Farben in Germany.

The research was discontinued in 1944 presumably because other work demanded more immediate attention and also because it had not become possible to prepare a catalyst which would give consistent and reproducible results. The polymerisation of acetylene to COT is still in the research stage, Mr. Kammermeyer states. Yields are only fair to good, reproducibility of results is poor, and the potential industrial utilisation of COT remains undetermined.

Most Important Revelation ?

It is believed, however, that this development is one of the most important uncovered by American chemical investigators in Germany. Because of its olefinic character COT is very reactive. It adds halogens rapidly, takes part in the diene synthesis and shows a tendency to dimerise and resinify. A number of compounds of potential commercial interest such as suberic acid and maleic anhydride adducts (suitable for lacquer raw materials) have been developed from COT.

None of these products at present warrants manufacture on a COT basis since it can be made more cheaply by other means. Nevertheless, "should the COT synthesis be improved to such an extent that it will become a reasonably cheap raw material then a whole series of products can be economically made from it," affirms Mr. Kammermeyer.

Summarising the process as worked out experimentally, a report states that a nickel cyanide catalyst suspended in tetrahydrofurane was brought into contact with acetylene in a nitrogen atmosphere at 15-20 atmospheres total pressure and temperatures varying from 70° to 150°C. After 50 to 60 hours' reaction, the experiment was usually stopped as the rate of acetylene take up became extremely slow.

A brownish black solution of the reaction product with suspended cuprene was obtained. The cuprene and catalyst were filtered off. Exact yields of products and by-products were not available, but it is estimated that the overall yield of COT and homologues, plus cuprene and benzene, was about 90 per cent of that of the COT and the formation of benzine and resin 10 to 15 per cent each of COT.

Subjects of 17 Patents

Seventeen German patent applications, covering the process, one of them a secret patent issued in 1943, were obtained by Mr. Kammermeyer. Apparently there are no foreign patents in existence. The original German text of the patent applications (with a brief abstract of each in English) and a translation of section of a manuscript by Dr. Reppe on theoretical considerations concerning the reaction mechanisms of COT are contained in the report, which also discusses the preparation of the catalyst and the solvent, as well as the experimental procedure for batch-wise operation in considerable detail. Safety considerations in preparing COT under high pressures are briefly described and drawings of two experimental high pressure autoclaves are included.

[Mimeographed copies of the 139-page report, No. PB-62593, Polymerisation of Acetylene to Cyclo. octatetraene, $3.50 from the Office of Technica-Services, U.S. Department of Commerce, Washington, 25, D.C.]

NEW SILICONE ADHESIVE

A NEW adhesive expressly designed for bonding silicone rubber to itself and to glass, metals, and ceramics has been developed by the (U.S.) General Electric Chemical Department. Known as G-E adhesive No. 12509, the new bonding agent, possessing properties similar to silicone rubber, remains flexible and resilient over temperatures ranging from −70°F. to 520°F. and withstands continuous temperatures of 300° to 350°F. in a dry air circulating oven. It can also be used to bond glass to glass, glass to metals, and metals to metals.

One application of the new adhesive that has proved especially useful is in securing silicone rubber door gaskets directly to oven doors, eliminating the need for clamps and bolts.

Aluminium Housing Slump

THE 3200 employees of Vickers-Armstrongs factory at Broughton face unemployment when the company's contract for aluminium houses ends in April. Although negotiations are said to be in progress to obtain a new industry for the factory, it seems likely that there will be a time-lag between the end of the present contract and the entry of a new firm.

Hopes that the existing contract would be renewed were dispelled on January 20 by Sir Percy Thomas, chairman of the Welsh Regional Board for Industry, when he attended the North Wales District Committee at Flint. He said that only 15,000 more aluminium houses were to be produced, and these had been allocated to other firms. Although expressing himself as "very sad" at the turn of events, Sir Percy revealed that the Board of Trade was being pressed to find a remedy.

NEW U.S. ALLOY PROCESS

A NEW process for the manufacture of alloy steels is reported to have been developed by the M. W. Kellogg Co., a U.S. concern. It is claimed that it will make a contribution towards the solution of the many complicated problems encountered by designers of turbo-jet engines, where extremely high temperatures are necessary. The new process relates to an electric ingot method for continuous casting. Ingots are stated to be made now in lengths varying from six inches to six feet, but this is not the limit to size. Alloying elements are fed continuously at a controlled rate into an electrical apparatus from which air is excluded and in which an ingot of any desired composition is made by progressive solidification. The accuracy of the quantities of alloying metals added and the solidification in the same container in which the melting of the metals takes place, are claimed to impart uniformity, both chemical and physical.

Less Coal in January.—Coal production figures issued by the Ministry of Fuel and Power for the first four weeeks of the new year show improvements on the corresponding weeks of last year despite a falling off last week, the respective figures being 3,140,200 tons (week ended January 3), 4,082,200 (January 10), 4,123,900 (January 17), and 4,096,800 (January 24).

Scrap Metal Stocks.—Stocks of non-ferrous and scrap metals held by the Directorate of Non-Ferrous Metals, and available for disposal on December 31, 1947, was 57,710 tons.

Scientific Production Systems

THE Department of Scientific and Industrial Research has started to issue a new series of Press releases under the heading of "Science and Productivity," of which the first, on fuel economy, was issued last week. The series will give examples of scientific results actually in use in industry. The subject matter will be new products, the effect of new processes, conservation of fuel and raw materials, utilisation of waste products and so on. The publications will be purely informative, attempting to indicate where items of interest lie and how further information can be obtained; they will contain the names, addresses and telephone numbers of authorities on the subject and of one or two firms actually using the scientific results. The subjects will, in the main, be those begun or completed at the Research Stations of the D.S.I.R. and, in particular, those carried out at the co-operative industrial research associations.

A U.S. INDICTMENT

AN illuminating comment on the prospects for continuing trade revival comes from the American Socialist, Arthur Koestler. In a New Year message to his Party, upon returning to his own country, he wrote of Britain:—

"The problem of incentives is the most difficult and most important problem of Socialist economy (and yet) the massacre of incentives continues. The last bit of fun has been exiled from their drab lives in this country of Virtue and Gloom, with its mean vindictive 'Work or Want' posters on every street corner; a slogan fit for a State orphanage or reformatory school, and which makes every self-respecting worker's stomach turn in disgust. . . . Two more years of this, and Labour will have irretrievably wasted its historic chance."

New Dutch Oil Company

A new company, the N.V. Nederlands Aardolie Mij., has recently been formed in the Netherlands with an initial share capital of f1.10 million (in 20 shares of f1.500,000 each) held in equal proportions by the Bataafsche Petroleum Mij., a subsidiary of the Royal Dutch-Shell group, and the Standard Oil Co. of New Jersey. The management, according to the *Petroleum Press Bureau*, will remain at present in the hands of the former company. The objects of this new venture are to undertake all types of major oil operations in the Netherlands. The recently developed Schoonebeek field is one of the principal interests.

More German Steel?

Reported Agreement for Swedish Oil

ACCORDING to Swiss Press reports, an agreement has been reached as the result of prolonged negotiations between British Military Government officials and the German iron and steel industry, for the resumption of imports of iron ore from Sweden which were used on a large scale in the Ruhr before the war. The suggested figure of 2.5 million metric tons is stated to have been reduced by the Military Government to 1.25 million tons, while pre-war supplies averaged annually 8-9 million tons.

It appears, however, that no final agreement has yet been made, as no conditions regarding prices and grades have been mentioned. Swedish ore prices have risen appreciably since the war and there is the additional difficulty of shipping, because Germany has no ore-freighters available.

Provision of supplies of Swedish ore is also stated to be linked with continued German scrap shipments to the United Kingdom. German metallurgical experts claim that the import of Swedish ores would lead to reduction of the extraordinarily high cost of production and at the same time to a saving of fuel.

SLOW REVIVAL IN FRANCE

FOR the first time since 1940, France's industrial output exceeded the pre-war level in the first six months of 1947. There has since been evidence, however, that this welcome development was not maintained in the second half of the year, because of labour unrest and other economic difficulties. Most significant of the main figures for January-June, coal output reached 91 per cent of the target figure and aggregated 25,070,000 tons, while generation of electric energy reached the planned output of 25,500 million kWh. Steel output (2,900,000 tons) was six points below the target, and cast-iron (300,000 tons) was 50 per cent below the scheduled figure. Among non-ferrous metals, lead output of 15,000 tons corresponded to a 79 per cent fulfilment of the Monnet plan, and an aluminium output of 26,000 tons was only 5 per cent below the target. Zinc (23,000 tons) exceeded the planned figure by 10 per cent, and the total of ferro-alloys by ? per cent. In the chemical sector, superphosphate output of 722,000 tons exceeded the schedule by 7 per cent; nitrogenous fertilisers represented only 76 per cent (76,000 tons). Output of sulphuric acid totalled 542,000 tons, equal to 90 per cent of the target figure.

Drugs for Export

Tests of Stability Needed

THE need for accelerated storage tests for drugs made for export was stressed by Mr. A. G. Fishburn, Ph.D., F.R.I.C., D.P.A., in a paper read to the Pharmaceutical Society of Great Britain on the place of pharmaceutical research in medicine.

The manufacturer, he said, must frequently satisfy himself that his product was stable over a period of several years in the tropics, and as it was clearly impracticable to send numerous samples overseas for long storage tests, techniques must be devised to give the same or similar results by "accelerated storage." If manufacturers' claims were to be put on a rational basis there should be some degree of standardisation for storage tests, particularly where products such as those controlled by the Therapeutic Substances Regulations were concerned, *i.e.*, when it was legally compulsory to indicate the storage life under named conditions.

Australian Zinc and Acid

A prelude to important chemical and metallurgical developments in Australia is the new agreement to collaborate by the Zinc Corporation, New Broken Hill Consolidated, and the Imperial Smelting Corporation. The managing director of the latter organisation, Mr. D. P. C. Neave, is expected in Australia early next month to plan the erection of new plants. These will be designed for the production of sulphuric acid from zinc concentrates, for use in fertiliser and chemical industries and the fabrication of zinc metal. The Zinc Corporation and New Broken Hill have contracted with Imperial Smelting to deliver 300,000 tons of zinc concentrates over the next three years.

U.S. Sulphur Production

Production of U.S. native sulphur in October amounted to 425,621 long tons. This continued the rising tendency of previous months, and set a new record, says a report from the U.S. Bureau of Mines. For purposes of comparison, the Bureau lists selected periods of 1946-47 which may be summarised thus :—

Period	Production (long tons)
September, 1947	406,964
October, 1947	425,621
January-October, 1946 ...	3,153,435
January-October, 1947 ...	3,646,995

CHEMICAL PRODUCTS OF COAL CARBONISATION—IV

Vast Field for Development of Acetylene Derivatives

by JOHN R. CAMPBELL, B.Sc., Ph.D., A.R.T.C., F.R.I.C.

MANY of the aromatic compounds isolated in quantity from coal tar by distillation and other methods of separation have found application as plastics intermediates. It has been estimated that the coal tar distillation industry could provide about 70 per cent of the plastics industry's requirements of such intermediates, chief among which is, of course, phenol. The polyamide type of synthetic fibre, represented by nylon, may be manufactured from benzene by way of hexamethylene diamine and adipic acid, all three of which contain six carbon atoms.

As an example of the use of one of the minor constituents, carbazole is now being used in the preparation of polyvinylcarbazole plastics. Two other minor constituents of coal tar which have received a good deal of attention in recent years are indene and coumarone, both of which are capable of polymerising to form resins which find application in the paper industry.

Rubber and Plasticisers

The preparation of synthetic rubber during the war assumed first rate importance and again recourse was had to coal tar products. Condensation of ethylene with benzene in the presence of aluminium chloride produces ethyl benzene which is easily dehydrogenated to styrene. Styrene polymerises to polystyrene and copolymerises with butadiene to form artificial rubbers of the Buna type. Vinyl pyridine is the latest contribution to the manufacture of synthetic rubber.

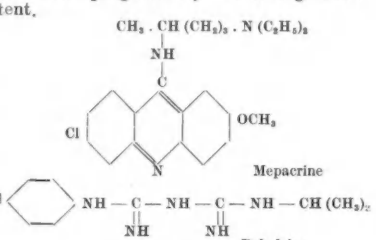
Plasticisers incorporated in thermoplastic moulding powders and lacquers to reduce brittleness in the finished product by improving flexibility and strength are neither solvents nor resins but more in the nature of lubricants. Many of these compounds are derived from coal-tar products, many being esters such as dibutyl phthalate, which is extensively used in protective coatings and has a high gelatinising power for cellulose nitrate; para toluene sulphonamide is another well-known plasticiser belonging to the non-ester type and derived from coal tar.

Modern detergents of importance are those containing sulphonic acid groups and manufactured from pure aromatic hydrocarbons or from mixtures of coal tar hydrocarbons. Probably the original product of this type was the well-known Turkey Red Oil, prepared by the action of sulphuric acid on olive oil. To-day the aromatic hydrocarbon is condensed with a straight chain mono-olefin and the product sulphonated. The resulting acid is then neutralised with caustic soda to give the surface active agent :—

$$R(CH_2)_n.CH=CH_2 + C_6H_6 \rightarrow R(CH_2)_n.CH.CH_3$$
$$\qquad\qquad\qquad

ting paraffin wax, followed by condensation with naphthalene or by condensing with phenols or naphthols and esterifying the products with phthalic anhydride or an analogue.

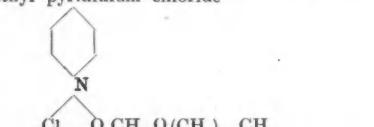
In addition to their application to the plastics industry, already indicated, the basic compounds of coal tar have other newer applications. The manufacture of synthetic drugs from these nitrogen compounds is rapidly extending with increasing knowledge of chemotherapy. In this connection the replacement of mepacrine by paludrine for the treatment of malaria is a notable example of how these synthetic products are progressively becoming more potent.



Mepacrine

Paludrine

One new outlet for the organic bases in coal tar is in the manufacture of water-repellent finishes for textiles. These finishes are not waterproofing resins but are compounds which react with the cellulosic fibres of the fabric to form a layer of water-repelling resinous cellulose ether. Stearoxy methyl pyridinium chloride

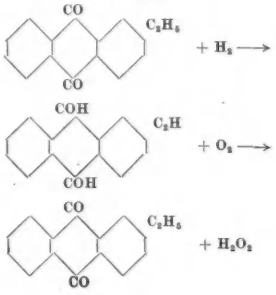


is typical of such compounds and is prepared by the interaction of the fatty alcohol with pyridine, formaldehyde and hydrochloric acid; in effect this compound is derived from fats, coal and salt. It is possible to replace the natural fats by synthetic fatty alcohols prepared by the Fischer-Tropsch method.

Within recent years many new cyclic and polycyclic hydrocarbons and their derivatives have been separated from coal tar in technical quantities and there is no doubt that the tar distillation industry will be able to provide many of these compounds now in demand and at present requiring to be synthesised.

Typical of these newer products of tar distillation are acenaphthene, chrysene, diphenyl, dicyclopentadiene, seven of the ten theoretically possible isomeric dimethyl naphthalenes, fluorene, fluoranthrene, indene, phenanthrene, pseudocumene, 2-methylnaphthalene, 2-3-6- and 1-3-7-trimethylnaphthalene, pyrene, 1-2 and 2-3-benzfluorene, cyanofluorenes, 1-, 3- and 9-methylphenanthrene, 2-hydroxyphenanthrene, 4-5-methylenephenanthrene, triphenylene, 1-2- and 2-3-benzanthracene, the two theoretically possible benzpyrenes, perylene, isoquinoline, lepidine, quinaldine, 2-4-6-collidine, carbazole, 2-4- and 2-6-lutidine, α-picoline, 2-methylindene, skatole, thionaphthene, courmarone, diphenyleneoxide, *o*-oxydiphenyl, diphenol, 1-2-4-, 1-3-4, 1-4-5- and 1-3-5 xylenols.

This is an impressive list and gives ample field for research and development, especially when it is realised that the synthesis of some of these compounds is not very easily accomplished. An interesting application of 2-methyl naphthalene, for example, is in its use for the preparation of the anti-haemorrhagic vitamin K by condensation of its hydroquinone with phytol. Mention must also be made of the use of β-ethyl anthraquinone (from ethyl benzene and phthalic anhydride) in Germany for the production of hydrogen peroxide



Acetylene

Although acetylene is not formed during coal carbonisation, it is manufactured by way of the major product of that carbonisation, coke. Acetylene will probably become the most important raw material for organic synthesis and that in the not too distant future. Its manufacture from calcium carbide was patented 50 years ago, since when it has been manufactured at intervals in this country on a small scale.

The details of the preparation of carbide are well-known, the requirements being coke, limestone and electric power. One ton of lime requires 0.72-ton of coke and the expenditure of 3.2 KW to produce 1 ton of calcium carbide. Allied to the manufacture of calcium carbide would be the preparation of calcium cyanamide, an important fertiliser but notable also because of its

conversion by sulphuric acid into dicyandiamide, which with ammonia under pressure yields the new resin, melamine, when condensed with formaldehyde.

Mention has already been made of the production of acetylene by the pyrolysis or controlled oxidation of the lower paraffins. These reactions have been examined in Germany and the U.S.A. and it has been claimed that they compare in cost of production with carbide for the manufacture of acetylene. It is essential, therefore, that the possibilities of manufacturing acetylene by these methods should be fully explored in this country, especially in view of the fact that we have been informed that there will probably be no surplus electric power for at least five years.

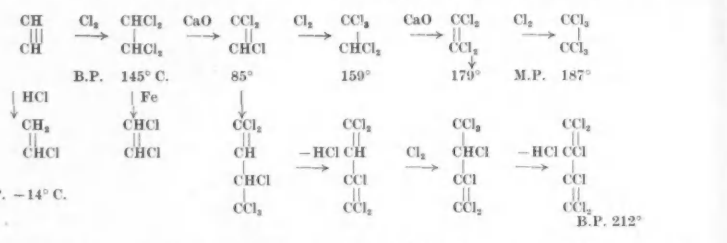
Enormous Possibilities

The possibilities connected with the chemistry of acetylene are enormous. In 1870, Berthelot showed how it could be polymerised by heat into benzene. In presence of catalysts, however, two molecules can polymerise to give vinyl acetylene

$$CH{\equiv}CH + CH{\equiv}CH \rightarrow CH_2{=}CH-C{\equiv}CH$$

which is the basis of the **rubber substitute,** neoprene.

Chlorination of acetylene has given rise to a very wide range of non-inflammable solvents and these give great scope for polymerisation to rubber-like substances.



The production of vinyl chloride by the combination of acetylene and hydrochloric acid is preferable to the method using ethylene and chlorine.

Many interesting reactions of acetylene were investigated in Germany during recent years by Reppe. With alcohols or phenols, mercaptans, amines, amides, carboxylic acids and even alkyl ammonium bases, it gives the corresponding vinyl derivatives in which the reactive hydrogen of the group is replaced by the vinyl grouping $CH_2{=}CH-$ which appears in so many of the new synthetic materials. With polyhydric alcohols, such as glycol or glycerol, ring closure can be effected to give 5 or 6 membered cyclic acetals, *e.g.*

Of the application of the vinyl ethers mention need be made only of their hydrolysis to aldehydes in an acid medium :—

$$CH_2{=}CH.O.CH_2{+}H_2O \longrightarrow CH_3.CHO + CH_3OH$$

This is really the second part of the overall reaction

$$CH{\equiv}CH + H_2O \rightarrow CH_3.CHO$$

the methyl alcohol acting merely as a catalyst.

The vinyl ethers also polymerise to give ether substituted paraffin compounds,

$$CH_2{=}CH \rightarrow \left[-CH_2-\underset{\underset{OR}{|}}{CH}-CH_2-\underset{\underset{OR}{|}}{CH}-CH_2-\underset{\underset{OR}{|}}{CH}-\right]_n$$

in presence of certain metallic chlorides. These polyvinyl ethers are used in the varnish, adhesive and leather industries. The corresponding phenol derivatives give ingredients for synthetic rubber of the buna type.

With carbazole, a coal tar compound, the vinyl derivatives formed give on polymerisation thermoplastic resins with high heat resistance and outstanding electrical properties.

Many derivatives of acetylene containing the exceptionally reactive grouping $-C{\equiv}CH$ were prepared in Germany by Reppe, leading to very useful intermediate products. Typical of these is the reaction of acetylene with formaldehyde

$$H.CHO + CH{\equiv}CH \rightarrow \underset{\text{Propargyl alcohol}}{HOCH_2-C{\equiv}CH}$$

$$H.CHO + HOCH_2-C{\equiv}CH \rightarrow \underset{\text{Butine diol}}{HOCH_2-C{\equiv}C-CH_2OH}$$

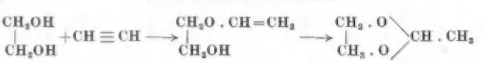
Butine diol can be hydrogenated in presence of nickel to give butane diol.

$$HOCH_2.CH_2.CH_2.CH_2OH$$

which, on dehydration at 300° C. and 100 atmospheres pressure in presence of 30 per cent phosphoric acid yields tetrahydrofurane and butadiene

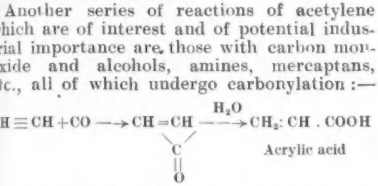
$$HOCH_2.CH_2.CH_2.CH_2OH \longrightarrow H_2O + \underset{\underset{CH_2}{|}\quad\quad\underset{CH_2}{|}}{\overset{CH_2-CH_2}{\diagdown\quad\diagup}}O$$

$$HOCH_2.CH_2.CH_2.CH_2OH \longrightarrow 2H_2O + CH_2{=}CH-CH{=}CH$$

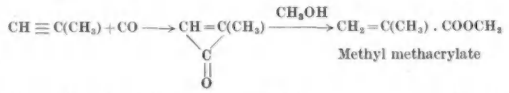


By means of the first of these two reactions a number of pharmaceutical products and glycerine substitutes were made available, while butadiene is the base for the manufacture of buna rubber.

Another series of reactions of acetylene which are of interest and of potential industrial importance are those with carbon monoxide and alcohols, amines, mercaptans, etc., all of which undergo carbonylation :—



A similar reaction using methyl acetylene in place of acetylene gives rise directly to methyl methacrylate by making use of methyl alcohol instead of water :—

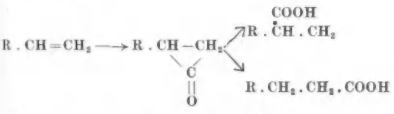


These reactions are brought about by using nickel carbonyl to yield carbon monoxide and hydrolysing the product in acid solution at 40°C. The methyl acetylene is obtained by converting calcium carbide into magnesium carbide (Mg_2C_3) and hydrolysing in the same way as with calcium carbide :—

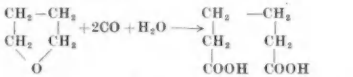
$$Mg_2C_3 + 2H_2O \rightarrow 2MgO + CH{\equiv}C(CH_3)$$

This gives a very quick method of obtaining the methyl methacrylate monomer.

The carbonylation reaction applies also to olefins :—



Tetrahydrofurane reacts with carbon monoxide to give adipic acid



The dinitrile of this acid on hydrogenation gives hexamethylene diamine, the base required for the manufacture of nylon.

With hydrogen cyanide in presence of nickel, copper and potassium chloride catalysts at 85°-90°C., acetylene gives acrylonitrile in 75 per cent yield. The relationship of this substance with the methyl methacrylate ester polymers has already been mentioned. It is important to note, however, that the use of ethylene as the starting material increases the number of manufacturing operations and reduces the yields.

Many other more elaborate reactions, leading to the production of more complex molecules, can be carried out with acetylene, but this leads to realms of organic chemistry which are possibly outside the scope of this paper. The simpler examples already given, however, illustrate the very great importance of having available a source of this simple hydrocarbon.

Conclusion

This brief survey of the application of coal carbonisation products to the chemical industry emphasises the action which must be taken in a country such as this where the basic indigenous material is coal. It shows that there are great potentialities in the utilisation of this source of carbon for synthetic purposes and indicates the possibilities which exist for the development of a branch of the chemical industry within, or closely co-ordinated with, the existing carbonisation industries.

There would appear to be no good reason why such substances as nylon, synthetic resins and plastics generally should not be manufactured at coke ovens and gas works, thereby embracing an important and rapidly developing section of the chemical industry. Much experimental work will still be necessary to determine, for example, the most effective means of separating the hydrocarbons desired, the degree of purity to which they must conform and the amount of treatment to which they should be submitted before passing out of the hands of the carbonisation industry if that industry finds no incentive to produce a finished marketable product.

The ground on the purely chemical side, however, has been well prepared for a very extensive development, once the raw materials become available. When it is considered that over 40 million tons of coal are subjected to high temperature carbonisation per year in this country, it would appear to be well within the compass of the existing carbonisation industries to provide all the requirements of the newer organic chemical industry.

(Concluded)

Previous parts of this paper appeared in THE CHEMICAL AGE on December 27, January 3 and 17.

PRINCIPLES OF THE PILOT PLANT

A Reasoned Progress To Save Fruitless Effort

by H. L. LARCOMBE

THE first question which arises when a pilot plant is being considered is "Is it really necessary?" Whether it is to be an expensive collection of specially designed equipment or merely an elaborate laboratory set-up it will absorb money and time and it must enable us to save an equivalent sum by providing information which cannot be obtained in another way more cheaply. In short, the pilot plant must show a profit on the capital outlay.

Analysing further this question of the necessity we have to determine if the information required is not available already. Has a thorough search of literature been made? Have none of the published works on the question supplied the information? Not only is it cheaper to use the authoritative findings of other people but, even if the information is not completely what we require, it can provide a much more advanced starting line.

Equally important, too, is the fact that previous laboratory experience can indicate the snags which would most likely have impeded us too. There is no virtue in following the steps of some previous worker.

The next step is to orient ourselves. A pilot plant is an item of the whole development programme and we should make absolutely certain that this is the opportune moment to start. To go forward with the construction of a pilot unit we must be in possession of a great deal more information than the reports and photographs on the subject of the research laboratory.

Seven Stages

A development programme should start as a sound idea and finish as a sound commercial enterprise. It comprises several well-marked phases, which may vary according to the company's organisation and the product, but these variations are mostly in degree. Therefore the steps may be generalised as follows:—

1. *The idea.* This can germinate anywhere and initiates the whole programme.

2. *Laboratory research.* Here the idea is tried out in laboratory equipment and should produce a general background of relevant information.

3. *Product evaluation.* A cost analysis and market research to determine whether the projected product or process is worth developing.

4. *Advanced process study.* This should break down the process into well-defined steps or unit processes, *e.g.*, distillation, evaporation, separation, hydrogenation, etc. This determines the outline of the next step.

5. *Engineering study.* Approximate design and cost estimate of the commercial plant and determination of what information is required and whether the process can go straight into the commercial plant stage or whether the next stage should be a pilot plant.

6. *Pilot plant.* The design, construction and operation of a pilot unit to obtain quantitative data required to build the commercial plant (or for purposes outlined later).

7. *Commercial plant.* Building the production plant and putting all the information gathered in the steps indicated above, into a profit-making unit which will pay wages to employees, pay shareholders, finance other development, and above all serve a definite public need.

It will be seen from the programme that the pilot plant is almost at the end of the chain of development and any of the other steps which precede it influence it to some degree. It is, therefore, essential that all the information obtained from the other steps is sieved and analysed for any points of information which may influence the conception, layout and operation of the pilot plant. It always pays to wait a short time and obtain all the information that may influence the pilot plant before going ahead to obtain data from tests.

Objectives

Having got all the steps in the development in correct perspective, it is as well to ask again "What is the purpose of the pilot plant, and what are the reasons for building it?" There may be one or several reasons, and we must get them in their order of importance as far as known facts will allow or invite the risk of subsequent trouble in the commercial plant which could have been avoided. Typical reasons might be:—

1. To obtain the benefits of seeing a laboratory process operate on a larger scale.

2. To obtain larger quantities of material for market research and consumer trial.

3. To determine suitable materials of construction.

4. To determine whether a new product could be processed in existing equipment.

5. To discover the differences in reaction

and production rates at high or low pressures not determinable in laboratory glassware.

6. To obtain quantitative data for the large commercial plant.

7. To train operators and engineers for the commercial plant.

8. To test the suitability of differing equipment, *e.g.*, centrifugal pumps or positive displacement pumps.

9. The cost of the raw materials may be so high that a small-scale plant is desirable.

There can, of course, be many more reasons, depending on the individual problem or product, but there should in any case be some conception of what information is to have top priority in the test runs in the pilot plant. If, for instance, there is no obvious corrosion problem there is no excuse for spending a large proportion of the time on protracted corrosion tests. Determine what you want to discover and, secondly, the means of discovering it.

Design

We have already visualised the commercial plant (Step 5 in the Development Schedule) in its size and production rate. It has probably been broken down into well-defined unit processes. At this point we must resist the familiar temptation to start "scaling down" the commercial plant into a sort of model, assuming that this is a pilot plant.

To what extent should the pilot apparatus parallel the commercial plant? If the commercial plant is to be a continuous production process, the pilot plant should be planned for the same principle. Batch results cannot always be successfully translated into a basis for continuous production.

Operations which are to be automatically controlled in the commercial plant should be dealt with in the same way in the pilot plant. Automatic control cannot successfully and economically be superimposed on a process; it must in effect be "built in," and to do this one must know most of the answers beforehand.

Differing Volumes

Regulation of the processes may be easier or more difficult on the pilot job than on the commercial plant. The small volume of fluids and fluid spaces will very possibly effectively cushion irregularities and permit smooth control. Certain types of control, on the other hand, are more adaptable in the pilot plant than in the commercial plant, because of time-lag on the larger equipment.

These are points which require experience in process work, and although the question of personnel is not being discussed at this point, it is obvious that in sorting out the snags and anticipating difficulty there is no substitute for experience in the investigator, to confer a sense of proportion and enable the attractions of strictly academic pursuit or mathematical gymnastics to be resisted.

Because the pilot plant is a parallel to the commercial plant, we should also ensure services such as compressed air, steam, water and electricity should be as far as possible identical. If x p.s.i. steam is planned to be used on the large plant x p.s.i. must obviously be available to the small plant; if river water is to be used on the large plant it must be used on both. It is possible that because of sludge or foreign matter in the river water an entirely different heat transfer problem arises which would not have occurred with mains water. Where mains water is used in the process make sure that the mains water available at the site of the commercial plant (which may be different from that of the pilot plant) does not possess any considerable qualities of hardness, temperature, etc., not present in the pilot plant mains water.

Agitation is a point also worthy of study. Very often we find that agitation in the laboratory and pilot plant is so vigorous that it is not physically possible to reproduce it in the full-scale plant. Agitator drives in pilot plants should be arranged so that speed can be readily changed.

Location

Again, to ensure parallel conditions, the type of housing should be similar. If the commercial plant is to be located outdoors then the pilot plant should be there too; instrument dials which require frequent observation should preferably be located in a shed, but the equipment generally should simulate the large-scale plant conditions.

These then are the outlines of the broad similarity which should exist between pilot plant and commercial plant, not so much one of proportion but of fundamental engineering ideas.

The correct utilisation of the pilot plant calls equally for logical thinking. Every action should be studied and criticised and subjected to practical criteria. Development is as much a part of profit-making as actual production. Management, administration and design should be just as efficient.

For reasons familiar to all in industry, it is not always possible to do everything in the ideal way, but the important point is that we should consider what would be the ideal before taking action.

(To be continued)

PROGRESS IN DRUGS AND FINE CHEMICALS

Alternative Anti-Tubercular Agents

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

WAKSMAN, who first isolated streptomycin in 1943, has briefly summarised the knowledge of antibiotics and tuberculosis (*J. Amer. Med. Ass.*, 1947, *135*, 478). He points out that, as far back as 1880, workers were aware that an antagonism existed between *Mycobacterium tuberculosis* and many bacteria and fungi; but it has been among the Actinomycetes that the highest anti-tubercular activity has been found, together with acceptable levels of toxicity.

There may be other and more effective anti-tubercular agents yet to be found among the Actinomycetes sp. and it it seems that the menace of streptomycin resistance may spur on workers in this field to a more intensive search.

Other Weapons

The search for anti-tubercular substances has continued in directions other than antibiotics and a very great deal of work is being carried out in connection with the exploration of relatively simple compounds as tuberculostatic or tuberculocidal agents.

For example, Kirkwood and Phillips (*J. Amer. Chem. Soc.*, 1947, *69*, 934) have studied the antitubercular action of 1 : 1 : 1-trichloro-bis (o-aminoethyl) ethane (1). Study of Läuger hypothesis regarding the mode of action of DDT and its fluorine analogue suggested that (1) might be tuberculostatic. These workers had already demonstrated that 1 : 1-dichloro-bis (*p*-chlorphenyl)-ethylene, when fed to rats, accumulated in the depôt fat to approximately the same extent as DDT fed at the same level.

It seemed that the amino analogue (2), might have lipid affinities and also be tuberculostatic. It was found that both (1) and (2) did indeed completely inhibit *M. tuberculosis* at a dilution of 1/100,000 and (1) has been found markedly to control tuberculosis in guinea-pigs. *In vivo* tests proceed.

The compound (1) is obtained according to the method of Bayer (*Ber.*, 1872, *5*, 1094) from 1 : 1 : 1-trichloro-2 : 2-*bis* phenylethane by nitration at 30°C. with fuming nitric acid and subsequent reduction with Raneg nickel catalyst at 60 p.s.i.

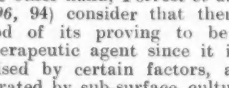
Use of Ethers

Friedman *et al.* (*J. Amer. Chem. Soc.*, 1947, *69*, 1204) found a series of ethers of 2-hydroxy-5-aminopyridine to have tuberculostatic action *in vitro* with a maximum at the 2-butoxy ether. Substitution of one or both amino hydrogens did not improve the effect. Feinstein *et al.* (*J. Pharmacol.*, 1947, *89*, 153) report that 5-amino-2-butoxypyridine is a powerful and specific inhibitor of *M. tuberculosis*.

On the other hand, Forrest *et al.* (*Nature*, 1947, *160*, 94) consider that there is little likelihood of its proving to be a useful chemotherapeutic agent since it is strongly antagonised by certain factors, as can be demonstrated by sub-surface cultures in the presence of serum albumin and certain growth stimulating lipids.

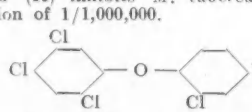
Dempsey and Logg (*Lancet*, December 13, 1947, 871), following up the earlier work of Lehmann in Sweden on the tuberculostatic effect of derivatives of benzoic and salicylic acid, have found beneficial results in the treatment of patients with various tuberculosis lesions by *p*-aminosalicylic acid when a blood level of at least 10 mg./100 ml. is maintained.

Barry, O'Rourke and Twomey (*Nature*, 1947, *160*, 800) describe some extensive experiments among diphenyl ether derivatives and diphenylene oxide derivatives. The first series examined were those of type (I) where X is one of a number of solubilising groups.



(I)

The greatest activity against *M. tuberculosis* was found in the *p*-hydroxydiphenyl ether and *p-aminodiphenyl* ether. The activity of the members of the series is much reduced when X is in the *ortho-* position, as it is, also when X occupies either of the two *meta-* positions. Introduction of halogen into the nucleus with X in the *para-* position enhances activity. Increasing halogenation of the nucleus enhances activity, but compounds of this series have not yet been fully explored. Thus compound (II) inhibits *M. tuberculosis* at a dilution of 1/1,000,000.



(II)

The effect of the introduction of halogen into the nucleus is also one of enhancement where the solubilising group is other than

(*Continued on page 179*)

Tin Reclamation in Spain

Dry Chloride Method Favourably Reviewed

IN Spain, as elsewhere, there is a great shortage of tin, the canning industry being particularly affected. The Government recently appealed to private interests to find means of overcoming this shortage by discovering new sources of stannous minerals, by making better use of existing supplies, or by reclamation of tinplate scrap. Problems arising from the last-mentioned proposal are discussed in ION (*Rev. Espan. de Quim. Aplicada*) September, 1947, Vol. 7, pp. 605-12, by Pedro López Gómez.

In former years, although various small-scale attempts have been made to recover tin from this source, little has been achieved, and that chiefly by German dominated interests. That there is, however, fairly abundant material—up to 10,000 tons per year—may be deduced from the fact that in Santander alone (assuming a normal season) the canning industry can provide more than 500 tons of scrap.

Tin used for plate ranges from 2-2½ per cent for the thick, and 4-4½ per cent for the thin grade. The author maintains also that much of the soft Martin sheet steel could be utilised direct. In this connection he reviews the various recovery methods, which he groups under four headings, viz: chemical (wet), metallurgical (dry), electrolytic in acid or alkaline solution, and the dry chlorine method. Thorough preliminary cleaning is essential in all cases. Reference is made to some of the principal authorities or patentees, such as Th. Goldschmidt, Schultze, Reinecken-Ponsgenykopp, Laroque, Edmunds, Wolterez, Gutensohn (electrolytic), and J. Weber.

In the author's view, the fourth (Webber's modification of the dry chlorine, low temperature process) method, offers many advantages over the others, including the almost immediate availability of the sheet-iron or steel (Martin) for further use. The chief difficulty is the supply of home-produced chlorine. Although a certain amount of liquid chlorine is made in Gerona and Torrelavega, it is controlled, and a licence would be needed for its use in tin recovery. Alternatively, the Government could import chlorine for the purpose. Specification and lay-out, with drawings, are given of a proposed plant for treating four tons of scrap for tin recovery per day.

The scrap is washed in sodium carbonate solution, compressed into compacts of 50 kg. under 200 kg./cm.² pressure, dried, and conveyed to the de-tinning plant which consists of two cylindrical boilers with water-cooled jackets, into which chlorine gas is introduced under 2 atm. pressure until all the tin is converted into stannic chloride. The estimated daily yield is 251 kg., from which 115 kg. of metallic tin would be obtained by the zinc reaction method, and the chlorine sold as such. Chlorine consumption is 230-240 kg. Estimated costs and yields are stated.

PROGRESS OF DRUGS—*Continued*

amino; but replacement of amino by amidino weakens activity, although the effect of halogenation of the amidino compound has not yet been examined by the authors.

Other workers have found the *p*-hydroxy-*diphenylethers* to have antibacterial properties in general. For example, the series is effective against *S. aureus* and *E. coli* even when the oxygen link is replaced by selenium, sulphur, NH or CH_2.

The authors have yet to explore the tuberculostatic effect of compounds of type (I) with these different linkages. Compounds with a -O-$(CH_2)_n$— link display considerable antitubercular activity. When n = 2 the inhibitory dilution is 1/150,000. The compound is then derived from phenylethyl alcohol which has been isolated recently from tubercle bacilli. To this compound has been ascribed in part the characteristic odour of tubercle bacilli.

To be continued

Cornish Tin Neglected

Possible 10,000 Tons a Year

BRITAIN's indigenous tin is greatly underdeveloped. This was the thesis of a review by Mr. W. Tregonning Hooper, speaking at the Winter Festival of the Old Cornwall Societies at Falmouth. He maintained that 10,000 tons of tin could be produced annually in Cornwall. Mr. Hooper, an acknowledged expert on Cornish mining and mineral resources, said:—

"The best-informed authorities are emphatic that there is as much mineral left in Cornwall as has been produced here through the ages.

"I should like to see Cornwall united in an appeal for a commission to be appointed by the Government to carry out an exhaustive research into the whole question. The commission should hold its inquiry here in Cornwall surrounded by grim evidence of a time when the county produced up to 200,000 tons of copper ore and 16,000 tons of tin a year."

STANDOLISATION

Spanish Study of Linseed Oil Technology

IN connection with the 3rd Congress of the Spanish Paint and Allied Industries, held in Madrid, November 11-18, a prize of 5000 pesetas was awarded to Drs. A. Vian and L. Yzu, for a paper entitled "Standolisation—Contribution in Theory and Practice." A verbatim report of the paper together with a description of the Congress proceedings, appear in ION (*Rev. Espan. de Quim. Aplicada*) Nov. 1947, pp.749-762.

Polymerisation of linseed oil both by the thermal and by the silent electric discharge methods was investigated and bibliographical references given, together with a specification of the qualities required in the stand oils produced. Most of the paper deals with the electrical method, to which the authors give the name voltolysis. The resulting product is termed voltolytic standoil or "voltol."

The electrical apparatus used is illustrated and described, the essential part being the condenser in which the oil to be treated serves as a di-electric. The structure of the products was studied by ultraviolet absorption spectra. Results are discussed at some length. Experimental methods used for both methods are described and illustrated, and study also made of absorption spectra in the u.v. range for polymerised linseed oil.

Conclusions

1. The results of other workers are confirmed, namely that the process of thermal standolisation comprises a preliminay phase or period of induction in which the double bond molecules are isomerised; and as the number of such molecules increases actual polymerisation or the second phase takes place.

2. The thermal method is cyclic, as indicated by the bathychromic effect in the u.v. absorption studies.

3. Voltolysis also proceeds through two stages analogous to those in the thermal method, namely: activation, and polymerisation. This phenomenon is general and occurs both with mineral oils and glyceridic oils, though the period of induction is much shorter with the latter.

4. The first phase in voltolysis is similar to that of induction in the thermal method, the molecule being isomerised by the electric discharge with formation of conjugated double bond radicals.

5. The concentration of isomerised molecules attained in voltolysis is much higher than in the thermal process.

6. The actual polymerisation—second phase of voltolysis—is a union by conjugated double bonds, with closed cycle as in the thermal method; also union by free radicals.

Among other interesting papers presented at the Congress were the following:—

The surface and protective coatings, Casa Pulcra; Spanish chrome pigments, J. M. Cavestany; Spanish zinc oxide industry, E. Ventura; Di-electric varnishes, L. Vallmitjana; Submarine (antifouling) paints, W. L. Wingate; Normalisation specifications, etc., S. Medina-Castellanos, P. E. Normand and R. G. Perez; Glycero-phthalic resins, J. M. Martinez Girona; Synthetic resins for varnishes, J. Jaume; Furfurol, E. Diaz.

Considerable attention was paid at the congress to tariffs, some of which are deemed very unfair and anomalous. This formed the subject of two papers by vice-president A. Oliart Raurich. Raw material supplies figured in a paper urging the more extensive cultivation of the plant *Lallamentia iberica* yielding an oil of the poppy oil class. *Alenrites fordii* for home production of wood oil was included in the final schedule of resolutions.

The Congress decided to establish a National Institute for Paints, Pigments, and Printing Inks, and Señores A. Oliart Raurich, Rafael Calvo, J. Martinez Roca, R. Mongay, and S. Medina-Castellanos were appointed to form an organising committee.

Scottish Shale Industry

Encouraging Labour Recruitment

IN response to repeated requests to the Ministry of Fuel for help in enlarging the labour force of the Scottish shale oil industry, the Ministry of Labour has agreed to (1) the inclusion of the industry on the "First Preference" list for allocation of workers under the Control of Engagements Order. This order does not prevent the movement of men who want to leave the industry. (2) The suspension for the time being of the call-up of underground workers for service in H.M. Forces.

Consideration is also being given to applications submitted by Scottish Oils, Ltd., for the release of men from the Forces who were previously in the employment and are willing to work in the shale mines. By an arrangement with the National Union of Shale Miners and Oil Workers the oil company has engaged 40 European volunteer workers and 65 Poles.

American Chemical Notebook

From Our New York Correspondent

"HE works faster because he wants to " was one of the more interesting conclusions about the average U.S. industrial worker reached in the report by the National Industrial Conference Board, of New York, some aspects of which were discussed in "Notes and Comments" last week. This report, it is now revealed, had as its basis findings of English "working-parties" who studied individual U.S. industries on the spot and agreed that productivity of the American worker exceeded that of his English counterpart in every industry surveyed. The estimated higher production of the U.S. worker was found to be: Cotton, 18-89 per cent; footwear, 75 per cent; garments, 25-50 per cent; wool weaving, U.K., 1937, 1835 yards per worker; U.S.A., 1945, 3633 yards. Several other equally striking contrasts were drawn and among the principal reasons adduced for the alleged disparity were the much higher degree of mechanisation and greater tool-power provided each worker even in the smaller U.S. factories; specialisation, intensified planning and preparation of work and the application of time and motion studies. In 1937 U.S. workers in manufacturing, serving 38.5 hours weekly, were said to have produced 2.3—2.4 more than their opposite numbers in England, working 47.5 hours. In war production claims this report, the same ratio was maintained.

* * *

Mr. Crawford H. Greenewalt, who joined the Du Pont organisation in 1922 as control chemist in the company's Philadelphia Works, this week became the tenth president of E. I. du Pont de Nemours & Co., and Mr. Walter S. Carpenter, Jr., former president, was elected chairman of the board, succeeding Mr. Lammont du Pont, who has retired from the chairmanship. At the same time it was announced that Walter J. Beadle, a vice-president and member of the board, had resigned as treasurer of the company and had been elected to membership of the Executive Committee. In addition to assuming the presidency of the company, Mr. Greenewalt, who is 45, became chairman of the Executive Committee, and a member of the Finance Committee. Mr. du Pont will continue as a member of the board, while Mr. Carpenter retains his membership on the Finance Committee. Mr. du Pont's resignation brings to an end a career that began in 1902, and played a large part in the expansion and diversification of the company's activities. In a letter sent to the company's 97,000 stockholders, Mr. Carpenter explained that the executive changes "marked the fifth time, since the start of this century, that the president of the company has resigned from that office at the age of sixty or less, and has been replaced by a younger man. Such a policy contributes to the revitalisation of the administration of that most important office."

* * *

Mr. Donald Gibb, head of the plastics sales division of the Dow Chemical Company, Michigan, this week announced that his company had formally released its trademark rights to the name "saran," permitting it to become the descriptive name of the product. He said the action was taken "in the interest of simplifying identification on various plastic materials whose chemical names have for years been confusing to press, trade and consumer alike." The term saran applies to a series of thermoplastic resins, chemically known as vinylidene chloride copolymers, originally developed by Dow in the later 'thirties and known especially for their resistance to a wide range of chemicals. Monofilaments of the plastic are currently becoming prominent in the textile field. Moisture-repellent packaging films and corrosion-resistant piping are other important uses.

* * *

Use of lactic acid in the manufacture of plastics will help to relieve the demand on a heavily-burdened petroleum chemicals industry. This claim is made by Dr. C. E. Rehberg, Marion B. Dixon, and Philip E. Meiss of the United States Department of Agriculture's Eastern Regional Research Laboratory. Raincoats, handbags, tobacco pouches, and hundreds of similar products are made of vinyl plastics, materials which would be of limited usefulness if they were not rendered pliable by petroleum softening agents. Agricultural waste, it is now established, can be converted into suitable plasticisers by treatment with lactic acid, which occurs widely in nature, not only in milk, and such new plasticisers can be substituted for the more than 60 million lb. of petroleum chemicals now employed annually for this purpose. One lb. of plasticiser is needed for every 2 lb. of vinyl plastics, the report added, the compounds employed being carefully selected to give pliability and softness, flexibility at low temperature, or resistance to sunlight to the finished product. Without plasticisers, few of the current uses of vinyl plastics would be possible.

Next Week's Events

MONDAY, FEBRUARY 2

Society of Chemical Industry (London Section and Road and Building Materials Group). Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 6.30 p.m. T. W. Parker: "Recent Advances in Building. Some Chemical Aspects."

Royal Institute of Chemistry, Chemical Society and Society of Chemical Industry (Bristol and S.W. Counties Sections). Exeter. W. Baker: "The Elucidation of the Structure of Penicillin."

Royal Society of Arts. John Adam Street, Adelphi, W.C.2, 4.30 p.m. Dr. A. C. Frayer: "The Metabolism of Fats" (Cantor Lecture).

TUESDAY, FEBRUARY 3

British Society of International Bibliography. Lecture Theatre, Institution of Electrical Engineers, Savoy Place, W.C.2, 2.30 p.m. Dr. A. M. Dyson: "International Chemical Abstracts and the New Notation for Organic Chemistry"; Mons. M. Jaffe: "The Adaptation of Dr. Dyson's Notation to the Universal Decimal Classification."

Electrodepositors' Technical Society (Midlands Centre). James Watt Memorial Institute, Great Charles Street, Birmingham. 6.30 p.m. J. W. Cuthbertson: "The Electrodeposition of Speculum"; W. H. Sawyer: "Practical Aspects of Speculum Plating."

WEDNESDAY, FEBRUARY 4

Society of Public Analysts. Rooms of the Chemical Society, Burlington House, Piccadilly, W.1, 7 p.m. D. W. Kent-Jones, A. J. Amos, P. S. Elias, R. C. A. Bradshaw and G. B. Thackray: "The Micro-analytical Test for Purity in Food, with Special Reference to Cereals."

Royal Institute of Chemistry (Dublin Section), Chemical Department, Trinity College, Dublin, 7.30 p.m. J. McGrath: "Blood Examination in Forensic Medicine."

Royal Society of Arts. John Adam Street, Adelphi, W.C.2, 2.30 p.m. Lieut-Col. L. Urwick: "Education for Management."

Royal Statistical Society (Birmingham Group). Chamber of Commerce, 95 New Street, Birmingham, 2, 6.30 p.m. K. Brownlee: "The Design of Experiments with Special Reference to the Chemical Industry."

THURSDAY, FEBRUARY 5

Chemical Society. Burlington House, Piccadilly, W.1, 7.30 p.m. G. M. Badger, J. W. Cook and T. Walker: "Synthesis of Piperidine Derivatives"; G. R. Clemo and T. J. King: "Strychnine."

(*Continued in next column.*)

Parliamentary Topics

No German Formaldehyde Available.—The present production of formaldehyde in the British zone of Germany is 2000 tons per month, compared with 3300 tons a month before the war. As local requirements are estimated at 2500 tons a month, none is available for export.—Mr. Mayhew.

Potash Supply.—I have no reason to believe that the supplies of potash arranged for will not be sufficient to meet the needs of this season's potato crop in Scotland.—Mr. Woodburn.

Duty on Light Oils.—Asked if he were aware of the dissatisfaction in many industries at the increasing cost of light hydrocarbon oils and if he would consider reducing or eliminating the duty on such oils, Sir Stafford Cripps said he would bear all relevant considerations in mind in preparing the next Budget.

Industrial Overalls.—It will not be possible either to permit the coupon-free sale of overalls or to increase the "Industrial Ten" coupons.—Mr. H. Wilson.

Coal Imports and Exports.—Imports of coal into the U.K. during November and December, 1947, amounted to 53,448 tons and 15,112 tons respectively. Exports during the same two periods were 63,767 tons and 157,663 tons respectively.—Mr. H. Gaitskell.

Benzole Production.—The amount of motor benzole produced in 1943 was 54 million gallons. Production in 1947 was 44 million gallons and some increase in 1948 is expected from the additional amount of coal to be carbonised at the coke ovens. Owing to the shortage of carbonising capacity the scope for increased production of benzole at gasworks is extremely limited.—Mr. H. Gaitskell.

FRIDAY, FEBRUARY 6

Society of Chemical Industry (Chemical Engineering Group — Glasgow Section). Royal Technical College, Glasgow, C.1, 7.15 p.m. Dr. A. G. White: "The Manufacture of Explosive Substances."

SATURDAY, FEBRUARY 7

Society of Chemical Industry (Chemical Engineering Group — Liverpool Section). Chemistry Lecture Theatre, The University, Liverpool, 2.30 p.m. E. J. Stephens: "What Can we Learn from the Mechanical Engineer in Process Design?"

LETTERS TO THE EDITOR

Use of Steam Traps

SIR,—In the September 20, 1947, issue of THE CHEMICAL AGE is an article (pp. 387-391) describing different indirect methods of heating. In the last few lines on page 389 the following statement is made: *Due to the low latent heat of the vapour, it is not possible to use traps as in normal steam practice.* You will be interested to hear that we have, as a matter of fact, been operating a Dowtherm heating system for several years using steam traps quite successfully. When working at high temperatures and pressures over, say, 5 atm., flashing will occur to a considerable degree, when the condensate leaves the trap. This, however, does not prevent the use of a trap, and the released vapour can be condensed by mixing with undercooled condensates from other heat loads or it can be used in a reboiler.—Yours, etc.,

S. RICHTER, Chemical Engineer.
Svenska Oljeslageriaktiebolaget,
Gothenburg 5, Sweden.

One Family's Record

SIR,—It will perhaps be of interest to your readers to know of this connection with the soap industry; and it would, of course, be equally interesting to me to know whether this remarkable record of service in this industry could be equalled by any other family.

My great-grandfather, William Hartland, came to Widnes from Worcester, and was an early associate of William Gossage, founder of the famous Widnes soap firm about the year 1854, and this family connection lasted until the closing of the works in 1932. During this period William Hartland and his descendants had a proud record of service totalling over 800 years. Sons in law, etc., served for 400 years, and there may be other members of the family who served whom I have been unable to trace. These figures are only approximate; it is difficult to give them exactly after such a lapse of time. At the present time I am the only remaining member of the family in the soap industry (with Messrs. Joseph Crosfield & Sons, Ltd., Warrington).

There are many other interesting things about this family, the chief of which, I think, is the Hartland Wesleyan Methodist Chapel at Widnes, which came into existence in the 1880's through the effort of William Hartland. When the young soap firm was in difficulties he provided the money to pay the wages and, I suppose, in return the grateful William Gossage bore a big slice of the cost and suggested the building should be called Hartland. Another interesting aspect is the claim that William Rogers (son-in-law) invented the noted "Gossages Mottled Soaps."—Yours, etc.,

W. G. HARTLAND.
Delegarth, Beaconsfield Road,
Widnes.

LESS PERUVIAN PETROLEUM

IN a report to the Canadian Embassy at Lima, Peru, published in *Foreign Trade*, December 31, Mr. C. J. Van Tighem, commercial secretary, states that production of petroleum and petroleum products continues to decline. At present the output of the principal field of the largest petroleum company is gradually falling off, and it is estimated that within ten years this field will no longer be producing in commercial quantities. Plans to develop a new area adjoining the present field have had to be post-postponed, as no agreement between the company and the Government has been reached.

Exploration work in the Oriente region, which was active during the past two years, has been gradually decreasing, and one of the principal companies has already withdrawn from this area. Exports of petroleum and petroleum products for the first half of 1947 amounted to 459,808 tons as compared with 495,030 tons in the same period of 1946.

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SCIENCE FELLOWSHIP

THE University of Glasgow has announced that J. & P. Coats, Ltd., thread manufacturers, Paisley, has provided funds for a Research Fellowship in Chemistry or Physics (excluding nuclear physics). It is tenable for two years at £300 per year, together with a supplementary allowance of £50 to cover research expenses. The Coats Fellowship will normally be awarded to a candidate with at least one year's experience in the University of Glasgow, but is open to science graduates of any British university. The selection board will consist of the professors in the Departments of Chemistry and Natural Philosophy. The company has also presented an Industrial Fellowship to the Technical Chemistry Department of the Royal Technical College, Glasgow, which will enable a post-graduate worker to undertake research in the field of textile chemistry or an allied subject. The value of this Fellowship is £350 per annum, and in the later stages it may be held at research institutions abroad.

Home News Items

A.E.U. Rejects Poles.—The Amalgamated Engineering Union has informed the Minister of Labour that it cannot agree to the employment of Poles in any occupation with which it is concerned.

Tar Course—Vacancies Filled.—The British Road Tar Association announces that all vacancies for the course of instruction on the Use of Tar in Roadmaking have now been filled. The course will commence on April 5, at the Road Research Laboratory.

Textile Conference.—The Textile Institute's annual conference is this year to be held at Buxton, from Wednesday, June 2 to Saturday, June 5 inclusive. The subject of the conference will be "Organisation of the Textile Industry and Textile Production."

27 Per Cent More Triplex Glass.—By accelerating conveyor belts from 165 to 210 ft. per min., Triplex Glass Co., Ltd., has increased its output of laminated safety glass by 27 per cent, at the same time reducing electricity consumption by one sixth. 85 per cent of production is earmarked for export.

Tube Workers' Wages Increased.—Wage increases for about 4000 workers in the Scottish tube industry were agreed upon at a conference in Glasgow, between the unions concerned and the Iron and Steel Trades' Confederation. Men and women of 21 years of age and over will receive increases of 6s. and 4s. 6d. a week respectively, with proportionate increases for younger workers.

Village Objects to I.C.I. Project.—Following representations by the Friends of the Lake District, Holme Parish Council and residents, the South Westmorland Plans Committee has rejected an application by Imperial Chemical Industries, Ltd., to use land at Holme Park as a store for steel containers of chemicals. The committee considers such use might be dangerous to surrounding property and damaging to the amenities.

Pay Rise for I.C.I. Workers.—A wage increase announced last week for riggers employed at the I.C.I. factory at Billingham, brings their wage rate up to 2s. 5½d. per hour. The announcement was made by Lord Terrington, chairman of the National Arbitration Tribunal, and is the outcome of representations made last October by the T.G.W.U., which maintained that riggers at Billingham had a greater number of difficult jobs than at any other of the company's factories.

Grimsby Works for Ciba.—Ciba, Ltd., has bought the last 70 acres of the Grimsby Corporation Industrial Estate, where work is to begin in the immediate future on the construction of a factory which, it is stated, will require a considerable labour force.

26,400 More Coalminers.—New entrants to the coalmining industry since its nationalisation last year, have totalled 100,000, including ex-servicemen and juveniles. Wastage from all causes amounted to 73,600, giving a net increase of 26,400 since nationalisation

Zinc Licences.—The Ministry of Supply announces that the granting of licences by the Directorate of Non-Ferrous Metals for the acquisition of unwrought zinc is suspended for the time being, pending revision of the Ministry's statutory selling prices of zinc.

Students' Visit.—A party of students from the Mathematical and Physical Society of University College visited Glaxo Laboratories, Ltd., on January 21. They were received by Dr. W. F. J. Cuthbertson, of the Microbiological Assay Department, and visited various sections of the laboratories.

Textile Institute—New Branch.—The inaugural meeting of the Burnley and district branch of the Lancashire section of the Textile Institute was held on Monday last at Manchester Road, Burnley, under the chairmanship of Mr. H. G. Greg. The new branch will also serve members in Todmorden, Nelson, Colne, Padiham, and the Rossendale Valley.

Big Increase in Textile Awards.—More than twice as many National Certificates in Textiles have been awarded as a result of the 1947 examinations as were awarded in 1946, it is announced by the Textile Institute which is jointly responsible with the Ministry of Education for the National Certificate scheme. Successful candidates for the Ordinary Certificate numbered 100, representing 85 per cent of the candidates.

Educational Bonuses.—An award of £15 under the Dunlop education scheme has been made to Miss R. K. Smith, of Port Dunlop chemical division on passing the Intermediate B.Sc. at London University. Awards of £10 have been given to each of four other workers in the chemical division on passing the intermediate B.Sc. (Completion), London, and two members of the technical department in the Dunlop works at Manchester, each receive £10 on obtaining national certificate in chemistry.

PERSONAL

VISCOUNT LEVERHULME, governor of Lever Brothers & Unilever, Ltd., has been nominated as an honorary member of the Chemists' Club of New York.

Mr. W. M. Cooper, manager of engineering to Monsanto Chemicals, Ltd., who is in charge of the newly-formed Control Engineering Department, comprising the divisions of chemical engineering, mechanical engineering, civil engineering, and construction engineering

MR. P. B. BAYLEY-BROWN, Alexandra Road, Southport, retired bleacher, left £118,226 (£118,130 net).

MR. KENNETH G. HOLDEN has been appointed chairman of Hardman & Holden, Ltd., in succession to MR. NORMAN N. HOLDEN, who retired on December 31.

MR. WILLIAM B. WALLIS, president of Pittsburgh (Pa.) Lectromelt Furnace Corporation, has been nominated for election in May as president of the American Foundrymen's Association, which has 10,000 members.

BRIGADIER N. F. PATTERSON, of Monsanto Chemical Works, Cefn Mawr, has been appointed to succeed MR. F. DAYLEY, of Courtaulds, Ltd., Flint, as chairman of the North Wales District Committee of the Welsh Regional Board for Industry.

MR. A. T. ROBERTSON, the Dunlop Rubber Company's planning manager, has been appointed factory manager (non-resident) of St. Mary's Mills, Leicester, and chief planner for the Fort Dunlop group of factories—Fort Dunlop, Stoke, Thornliebank and Leicester. He will be succeeded as planning manager by MR. G. H. WAY, at present manager of Fort Dunlop base stores.

MR. ELLIS HUNTER, deputy chairman and managing director of Dorman Long & Co., Ltd., has been re-elected president of the British Iron and Steel Federation for 1948.

Dr. W. H. Garrett, director of production to Monsanto Chemicals, Ltd., whom the Minister of Labour has appointed to the panel to represent employers on the National Arbitration Tribunal

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Clyde Alloy Changes

The following staff changes have been announced by the Clyde Alloy Steel Co., Ltd., Motherwell: MR. WILLIAM MCLACHLAN, secretary, to be director and secretary; MR. ROBERT M. LAWRIE, accountant, to be assistant secretary and accountant; MR. STEPHEN L. ROBERTSON, chief metallurgist, to be sales manager; and MR. GEORGE CUTHBERTSON, salesman, to be assistant sales manager.

The "Industrial 10."—The Board of Trade announces that the industrial ten clothing coupons supplement will be issued during the current rationing period. Employers should at once obtain application forms for their workpeople from the local office of the Ministry of Labour.

Norwegian Refinery for Aberdeen.—A Norwegian company is expected to start a cod liver oil factory at Aberdeen in the near future, application having been made by Aarsaether Bros., of Aalesund, for authority to operate a factory in the Scottish city. It is understood that the firm intends to refine cod liver oil for medicinal use, and that negotiations have proceeded for some time.

Reports on German and Japanese Industry

THE latest reports on German and Japanese Industry, now obtainable from H.M. Stationery Office at the prices quoted, include the following of interest to our readers.

BIOS 1048. German acetylene chemical industry. Acetylene and synthesis gas from hydrocarbons (8s.).

BIOS 1441. The German synthetic ammonia industry in the western zones (10s.).

BIOS 1492. German scientific films. Report on the use of educational, medical and industrial films in Germany (3s. 6d.).

BIOS 1600. Cellulose acetate flake and acetic anhydride (16s.).

BIOS 1618. Manufacture of monoalkyl ethers of ethylene glycol and of diethylene glycol (5s.).

BIOS 1619. Diethylene glycol diethyl ether (R.300) preparation (1s. 6d.).

BIOS/JAP/PR/775. Japanese metallurgical specifications. Iron and steel, special steels, special non-ferrous alloys (2s.).

BIOS/JAP/PR/914. Japanese fuels and lubricants. Fundamental hydrocarbon research (10s.).

BIOS/JAP/PR/1292. Japanese propellants. Research on non-volatile solvent powders (4s.).

BIOS/JAP/PR/1431. Tungsten and molybdenum metallurgy of Japan (2s. 6d.).

BIOS/JAP/PR/1498. Metallurgical examination of two Japanese oxygen cylinders (2s.).

BIOS 1530. Investigation of German methods of rubber/metal bonding (8s.).

BIOS 1549. Quarrying and processing of block stone in Germany (2s. 6d.).

BIOS 1558. German acetylene chemical industry. Miscellaneous research items I.G. Farbenindustrie (6s. 6d.).

BIOS 1597. Phthalic anhydride manufacture in Germany (7s.).

BIOS 1608. The manufacture of edible gelatin in Germany (3s. 6d.).

FIAT 1070. Technical and scientific developments related to the asbestos industry in Germany (4s. 6d.).

BIOS/JAP/PR/902-903. The raw aluminium industry of Japan (6s. 6d.).

BIOS/JAP/PR/1305. Japanese fuels and lubricants. Progress in the synthesis of liquid fuels from coal (30s.).

BIOS 1442. The German nitric acid industry in the western zones (14s.).

BIOS 1599. Sulphuric acid "cracking" by the Klepp-Lurgi process Schlebusch (1s. 6d.).

FIAT 979. Sintered iron shell rotating bands (1s.).

FIAT 1014. Miscellaneous pharmaceuticals and pharmaceutical intermediates manufactured at I.G. Farbenindustrie A.G., Elberfeld. Report in German (7s.).

FIAT 1040. Methods of standardisation of vat dye powders "fine" and acetate dyes at I.G. Farbenindustrie A.G., Ludwigshafen (4s. 6d.).

FIAT 1078. Metal hose, pipe line compensators and metal expansion joints in Germany (1s.).

FIAT 1114. Recent German research work on fluorine and fluorine compounds (6s.).

FIAT 1117. Treatment of spent pickling liquors containing sulphuric acid and iron sulphate (4s.).

FIAT 1136. The pressure hydrogenation of sulphite liquor. Report in German (1s. 6d.).

FIAT 1154. High temperature chlorination of methane at Hüls (1s.).

FIAT 1162. Steel production by vacuum electric furnace at Heraeus Vacuumschmelze, Hanau (1s.).

FIAT 1165. Production of mixed steels in Germany (1s.).

FIAT 1194. Production of inorganic phosphate salts at Bayerische Stickstoffwerke, A.G., Piesteritz, Germany (1s.).

BIOS 1614. Tungsten carbide tipped percussion drill bits (2s. 6d.).

BIOS 1636. Berzelius Metallhutten G.m.b.H., Duisburg-Wanheim. Manufacture of sulphuric acid (2s.).

FIAT 674. Heavy duty diesel engines manufactured by MAN (Maschinenfabrik, Augsburg-Nurnberg) (5s.).

FIAT 1924. Manufacture of antipyrine and pyramidon at I.G. Farbenindustrie A.G., Hoechst. Pharmaceutical products (7s.).

FIAT 1199. The manufacture of vinyl chloride by means of liquid catalysts (3s.).

FIAT 1203. Utilisation of oxygen in the German iron and steel industry (3s.).

BIOS/JAP/PR/1432. Iron and steel metallurgy of the Japanese Empire (4s. 6d.).

German Workers Transferred to Uranium Mines.—The Minister-President of Saxony (Russian zone), in an interview with Allied correspondents last week, said that 25,000 workers had been moved from coal mines and other jobs throughout Saxony to the mining region on the Czechoslovak frontier, where the Russians are reported to be extracting pitchblende for the production of uranium. The entire Ave mining area, he said, had been taken over by the Soviet Government.

Overseas News Items

Polish Penicillin Plant.—In Tarchomin, near Warsaw, a penicillin plant is being erected from equipment supplied by UNRRA. It is expected that the plant will be in operation early in 1949.

Canadian Aluminium Plant.—The large surplus aluminium reduction plant in Torrance, California, has been sold by the War Assets Administration to the Columbia Steel Company for more than $4 million.

Bulgarian Fertiliser Plant.—A nitrogen fertiliser plant is reported to be under construction in Marlino, in the Maritza coal basin of Bulgaria. It is to have an annual capacity of 35,000 metric tons of calcium nitrate and of 30,000 metric tons of ammonium nitrate.

Dutch Company Merger.—Zwitsal Fabrieken and its sister company Nederlandsche Fabriek van Pharmaceutisch-Chemische Producten N.V., have merged. The two enterprises will in future operate under the name of Verenigde Pharmaceutische Fabrieken N.V.

U.S. Zinc Price Rises.—Among the first reactions in the U.S.A. to the rising cost of zinc production is the decision by the American Zinc, Lead and Smelting Company to raise the price of prime western grade slab zinc by 1½ cents per lb. to 12 cents. The price had been stable since November, 1946.

Royal Dutch Oil Output.—Royal Dutch petroleum output in the Netherlands East Indies has reached nearly half of its pre-war level, despite the large number of oilfields still remaining in Republican territory. Monthly production figures for Far-Eastern areas are now given as: Souribaya 5000 tons; Tarakan 23,000 tons; Balikpapan 32,000 tons; Pladjoe 88,000 tons; and British North Borneo 213,000 tons.

New Premises for Canadian Chemical Firm.—As a further step in its expansion programme, Standard Chemical Co., Ltd., one of Canada's largest producers of charcoal, wood chemicals and salt, and distributors of a wide range of industrial chemicals, has recently purchased the plant and premises at 99 Vanderhoof Avenue, Leaside, Toronto, formerly occupied by Canadian Aircraft Instruments and Accessories, Ltd. The company, together with its subsidiary—Dalglish Chemicals, Ltd.—are expected to use the premises for the manufacture and bottling of their chemical cleansing and bleaching agents, and other chemicals now in course of development.

Australia Joins Rubber Study Group.—Australia has joined the Rubber Study Group, thus raising the number of member Governments to 13, and the number of delegations to 14, two of the latter being from the U.K.

Australian Uranium?—Government experts are testing deposits found last week in a disused copper mine in southern New South Wales, in which the finding of uranium ore was reported last week.

Portugal's Industrial Plans.—Portugal is to spend 1500 million escudos on dams and electrical schemes during the next 3-5 years. Another 500 million escudos is to be expended on fertilisers. Other forms of industrial expansion envisaged for the same period will absorb another 1000 million escudos.

Coal Production India.—The coal-producing provinces of the Dominion of India (Assam, Bengal, Bihar, Orissa and Central Provinces) achieved a combined output of 2,230,003 tons in October last, the respective figures for the provinces being 25,578, 672,577, 1,403,717, 8762 and 117,334.

Streptomycin Warning.—According to Prof. Lawrence Garrod, a St. Bartholomew's Hospital bacteriologist, lecturing at the University Hospital, Lisbon, last week, streptomycin will be useful only during the five years following its general availability. Thereafter, bacteria will have developed a resistance so great that the drug will become almost ineffective.

Billiton Mij Reconstruction.—At the recent annual general meeting of this leading Dutch tin company, it was stated that the reconstruction of plant, etc., was practically completed. In the financial year 1946-47 some 6000 tons of tin were produced. It is hoped to produce during the current year about 17,000 tons of tin in the Dutch East Indies.

Norway's Atomic Energy Institute.—The establishment of an Institute for Atomic Energy was announced in Norway in the first half of January. Its task will be to carry out research into "the application of the chain reactions which result from the splitting of certain heavier atom nuclei." The Institute's first concrete task will be the construction of a chain-reactor or uranium pile. The pile will probably be built near Oslo and will be constructed co-operatively by a number of Norwegian technical, scientific and industrial institutions. The Norewgian Parliament granted last year the sum of £250,000 for the purpose of atomic research.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

EVANOL, LTD. (formerly Digby & Co., manufacturing chemists, Ltd.), London, N., manufacturers of hair dyes &c. (M., 31/1/48). January 1, £2000 charge, to Westbourne Park Building Society; charged on 49 & 49a Elwood Streeet, Islington. *£1050. April 4, 1946.

Satisfaction

WALTON CHEMICAL CO., LTD., Liverpool. (MS., 31/1/48). Satisfaction January 1, of deb, reg. May 19, 1941.

Company News

Redfern's Rubber Works, Ltd., announces a net profit of £35,356 for the year just ended against £28,522 for the previous year. Final dividends recommended are: 3½ per cent on A and B preference shares (making 7½ per cent), and 5 per cent on the ordinary shares (making 10 per cent), plus 7½ per cent bonus.

New Companies Registered

Vixope, Ltd. (447,855).—Private company. Capital £1000. Manufacturers and distributors of chemicals and chemical products, washing powders, etc. Secretary: J. M. Reeves, 76 New Cavendish Street, W.1.

Vejeloid, Ltd. (448,385).—Private company. Capital £1000. Manufacturing chemists, etc. Directors: P. S. Powling and J. F. Byrne. Reg. office: Broadmead House, Panton Street, S.W.1.

United Drug & Chemical Co., Ltd. (12,244). Private company. Capital £15,000. Directors: W. J. Adamson, "Grianan," Enniscoone, Co. Sligo; M. G. Duncan and T. P. Barrett.

Glandula Preparations, Ltd. (447,944).—Private company. Capital £1000. Manufacturers of chemicals, medicines, etc. Directors: J. H. Charlton, W. Meads and W. McKeag. Secretary: J. H. Charlton. Reg. office: 21 Station Road, South Gosforth.

Elcho (Engineers), Ltd. (447,767).—Private company. Capital £5000. Suppliers and constructors of chemical plant, engineers, founders, machinists, etc. Directors: E. R. Davies and R. C. Taylor. Reg. office: 3 Kirkgate Buildings, Huddersfield.

J. C. Aimson, Ltd. (447,884).—Private company. Capital £100. Agents, merchants and manufacturers of household chemicals and detergents, other chemicals, drugs, toilet goods, etc. Director: R. Epstein. Reg. office: 203 Regent Street, W.1.

Corex Chemicals Co., Ltd. (448,113).—Private company. Capital £5000. Manufacturers of and exporters and importers of chemical and technical products, etc. Directors: Major H. May and O. Ziegler. Reg. office: 34 Henrietta Street, Covent Garden, W.C.2.

Chemical and Allied Stocks and Shares

APART from a general rise in gold mining shares early in the week, devaluation of the franc has not exerted a very marked influence on the stock market. British Funds declined sharply, with 3 per cent Transport stock no better than 96 while 2½ per cent Consols and Treasury Bonds both touched 79. Selling was attributed to the view that the Treasury is unlikely to support the market in order to maintain the 2 per cent basis of the "cheap money" policy, bearing in mind that efforts to peg Government borrowing at a 2½ per cent basis were unsuccessful when Mr. Dalton was Chancellor. Subsequently, gold shares encountered profit-taking and British Funds showed a partial rally.

Industrial shares were sold moderately at one time on the fear that the devalued franc will hamper our export drive. Later, however, industrials and shares of leading chemical and kindred companies became firmer. Imperial Chemical, for instance, rallied to 51s., Dunlop Rubber to 76s. 6d., and awaiting the dividend announcement, Borax Consolidated were 56s. 3d. Dividend estimates also strengthened British Aluminium to 53s. 3d., British Glues 4s. ordinary were well maintained at 23s. 9d., but British Drug Houses 5s. shares eased to 11s. 9d. Glaxo came back to £23, British Match improved to 44s. 9d., and United Molasses (54s.) were a firm feature.

B. Laporte rose to 95s. on the share-splitting proposals, W. J. Bush were 83s. 9d. and, elsewhere, Fisons again changed hands around 70s. Major & Co.'s 2s. ordinary strengthened to 4s. 4½d., and Boake Roberts at 34s. 6d. again moved higher. Hardman & Holden shares, after

another rise, came back to 33s. 9d. In other directions, Blythe Colour 4s. shares have been active around 70s. 6d. awaiting the dividend announcement. By the time these notes are read, dealings will probably have commenced in shares of Amber Chemical Industries, the 2s. ordinary having been placed around 9s. 10½d., and the 5 per cent cumulative preference £1 shares around 21s. 3d.

Turner & Newall were 48s. 4½d., and Lever Brothers 54s. 7½d., while on higher dividend talk, International Paint have been firm at £7¾, Monsanto Chemicals 5s. ordinary have been dealt in around 66s. 3d. Elsewhere, Imperial Smelting transferred around 22s. 3d. at which there is a yield of over 5¼ per cent, last year's dividend having been 6 per cent. Stocks and shares of gas companies were mostly marked down to slightly below their take-over levels, the compensation terms (which take for their pattern those for railway and electricity supply stockholders), being regarded as inequitable, even allowing for the general belief that British Gas Stock will be a 3 per cent stock and shorter-dated than British Transport stock.

A feature has been demand for iron and steel shares which were supported because of the attractive yields and the assumption that dividend payments to be announced this year will be at least maintained. Dorman Long at 30s. 6d., United Steel 30s. 3d., and Colvilles 31s. all yield over 5 per cent, while the return on Thomas & Baldwins 6s. 8d. shares (14s. 9d.) is over 6¼ per cent.

Boots Drug were 60s. 6d., Beechams deferred 23s., Griffiths Hughes 41s. 9d., and Sangers 35s. 3d. Oils were less prominent, although Anglo-Iranian rose to £9¼, while Shell were 82s. 9d., and the new shares 43s. 9d. Trinidad Leaseholds moved higher and Canadian Eagle were up to 38s. Dealings started in the new 4 per cent C. C. Wakefield preference which at 21s. 9d. commanded a premium of 9d. over the issue price.

British Chemical Prices

Market Reports

A SUSTAINED demand has been reported from most sections of the industrial chemicals market and conditions during the past week have generally remained unchanged. With little prospect of any immediate improvement in the alkali position there has been an increased pressure for supplies. Offers of the potash compounds are scarce and a ready outlet can be found for any available parcels. Lead oxides are enjoying a steady trade while the demand for zinc oxide and the copper compounds has been on a fairly good scale. An active business has also been maintained for hydrogen peroxide, arsenic, formaldehyde and acetone. Supplies of acetic acid are fully absorbed at the controlled rates. In the coal-tar products market there is little of fresh importance to record and the movement is mostly to meet home requirements and, with the exception of pitch, there is little for export.

MANCHESTER.—There has been no apparent easing of the demand for both light and heavy chemical products on the Manchester market during the week. Existing home trade orders, especially by the textile and allied industries and other principal users, are calling for steady deliveries and a good flow of delivery specifications has been dealt with. Replacement buying of the alkalis and other leading heavy chemicals has been fairly substantial in the aggregate. Additional export inquiries from shippers have also been in evidence. There has been a fair movement of fertiliser materials and in several directions the tendency is for this to expand. In the tar products market, a steady trade continues to be done.

GLASGOW.—Business has been maintained at a steady level in the home and export markets of the Scottish chemical trade during the week. New Year prices now seem to be stabilised, but recent increases have made matters more difficult in the export market. There is considerable interest in all classes of dyestuffs by foreign buyers who were formerly accustomed to rely upon German dyestuffs.

Glasgow's Science and Fuel Exhibition

A Scientific Engineering and Fuel Efficiency Exhibition will be held in the Kelvin Hall, Glasgow, from March 31 to April 17. The classifications approved for exhibition include modern scientific and technical developments in engineering and allied industries; general engineering tools and equipment—precision machine tools; light metals and alloys; plastics; woodworking machinery; drawing office equipment and materials; photographic apparatus and materials; intercommunication telephone equipment; heating, air-conditioning and ventilating equipment; mechanised stokers; marine and land boilers; marine and land insulation; pumping and heating plant; domestic cooking and heating equipment; catering equipment; sanitary appliances and materials; and technical and trade publications.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings London, W.C.2., at 1s. each.

Complete Specifications Open to Public Inspection

Method of and apparatus for purifying liquid hydrocyanic acid.—American Cyanamid Co. June 20, 1947. 12200/1947.

Production of bis-alkylolamides of dimerised fatty acids.—American Cyanamid Co. June, 18, 1946. 14534/1947.

Production of water-soluble derivatives of dialkylolamides of dimerised polyunsaturated fatty acids.—American Cyanamid Co. June 18, 1946. 14653/1947.

Production of olefinic nitriles.—American Cyanamid Co. Sept. 19, 1939. 28975/1947.

Methods of preparing monoethyldibenzofuran and 2-ethyldibenzofuran.—British Thomson-Houston Co., Ltd. June 13, 1946. 15399/1947.

Methods of preparing vinyldibenzofuran.—British Thomson-Houston Co., Ltd. June 13, 1946. 15400/1947.

Electromagnets.—British Thomson-Houston Co., Ltd. June 13, 1946. 15533/1947.

Organosilicon compounds.—British Thomson-Houston Co., Ltd. June 14, 1946. 15534/1947.

Methods of preparing 2-ethyldibenzofuran.—British Thomson-Houston Co., Ltd. June 13, 1946. 15667/1947.

Process for recovering cyclopentadiene.—Carnegie-Illinois Steel Corporation. July 17, 1941. 25031/1944.

Organo-siloxanes and methods of preparing them.—Corning Glass Works. Feb. 26, 1942. 8392/1946.

Sulphonated 1, 3-di (nitrophenyl) triazenes.—General Aniline & Film Corporation. June 20, 1946. 10152/1947.

Production of acetals and β-haloaldehydes.—General Aniline & Film Corporation. June 19, 1946. 10153/1947.

Preparation of diazo prints utilising resorcinol carbonamides as coupling components.—General Aniline & Film Corporation. June 15, 1946. 10424/1947.

Process for the decomposition of hydrocarbons.—Hercules Powder Co. June 20, 1946. 14695/1947.

Process of preparing acetoxymethyl salicylate and acetoxyethyl salicylate and .the improved compounds resulting therefrom.—Monsanto Chemical Co. June 19, 1946. 12335/1947.

Processes of preparing thioxane derivatives and the improved compounds resulting therefrom.—Monsanto Chemical Co. June 19, 1946. 12603/1947.

Process for preparing benzodioxane derivatives and the improved product resulting therefrom.—Monsanto Chemical Co. June 19, 1946. 13516/1947.

Process for preparing benzodioxane and the improved product resulting therefrom.—Monsanto Chemical Co. June 19, 1946. 13517/1947.

Process for heating a viscous liquid in a tube furnace, and tube furnaces suitable for carrying out this process.—De Bataafsche Petroleum Maatschappij. June 14, 1946. 15356/1947.

Method of separating stearine from mixtures of fatty acids containing olein and unsaponifiable material.—Neudert, G., and Lange, T. A. June 13, 1946. 15476/1947.

Process for the production of complete fertilisers.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. June 3, 1939. 32477/1947.

Process of recovering potassium from diluted solutions.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Feb. 13, 1940. 32478/1947.

Continuous nitration apparatus. — Olin Industries, Inc. March 31, 1943. 32441-42/1947.

Process for preparing a stable aqueous emulsion of polymerised normally liquid water-insoluble polymerisable compound and the stable aqueous emulsion resulting from said process.—Shawinigan Resins Corporation. June 19, 1946. 11844/1947.

Water-soluble dyestuffs derived from sulphuretted tetracene.—Soc. Anon. de Matieres Colorantes et Produits Chimiques Francolor. June 12, 1946. 15289-90/1947.

Process for reclaiming vulcanised rubber scrap.—United States Rubber Co. June 5, 1946. 8497/1947.

Process for producing hydrogen.—Universal Oil Products Co. Sept. 26, 1945. 5976/1947.

Starch processing and products.—R. T. Vanderbilt Co., Inc. June 5, 1946. 8832/1947.

Process for the manufacture of refined aluminium.—Aktieselskabet Ardal Verk. Sept. 20, 1945. 33610/1947.

Process for the production of opium alkaloids.—Alkaloida Vegyeszeti Gyar r.t. June 7, 1939. 33680/1947.

Preparation of plasticisable elastomeric compositions.—American Cyanamid Co. June 28, 1946. 13219/1947.

Process for the production of ethyl 4-hydroxy-coumarin-3-carboxylate.—D. Beke. May 25, 1945. 33667/1947.

Cellulose esters.—British Celanese, Ltd. July 2, 1946. 15264/1947.

Aminoformaldehyde resin compositions incorporating latent curing agents.—British Industrial Plastics, Ltd.—June 28, 1946. 17075/1947.

Thermo-setting moulding compositions. — British Industrial Plastics, Ltd. July 3, 1946. 17489/1947.

Fluorinated olefin polymers.—California Research Corporation. June 28, 1946. 14577/1947.

Method of cleansing materials contaminated with heavy metal oxides or water-insoluble heavy metal salts, and manufacture of preparations therefor.—C.I.B.A., Ltd. June 27, 1946. 15240-41/1947.

Process for softening fibrous materials and the manufacture of products suitable therefor.—C.I.B.A., Ltd. June 28, 1946. 16348-49/1947.

Manufacture of dyestuffs of the anthraquinone series.—C.I.B.A., Ltd. June 28, 1946. 16350-51/1947.

Process for dyeing animal and other fibres having similar properties.—C.I.B.A., Ltd. June 28, 1946. 17041-42/1947.

Manufacture of new pyrimidine compounds.—C.I.B.A. Ltd. June 28, 1946. 17043-44/1947.

Filter for purifying a liquid or gaseous fluid.—J. Depallens. June 14, 1946. 24743/1947.

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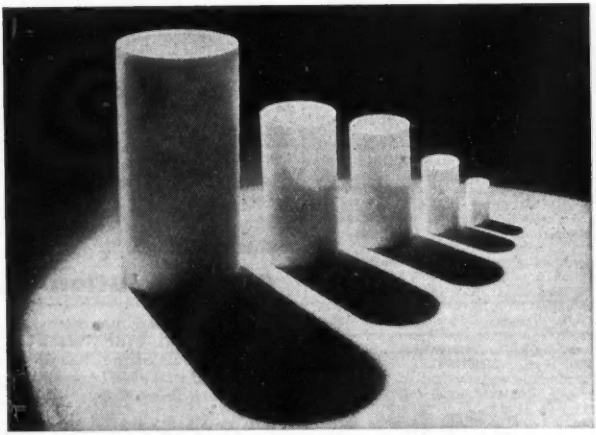

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Insecticidal composition and method.—Koppers Co., Inc. March 26, 1946. 33648/1947.

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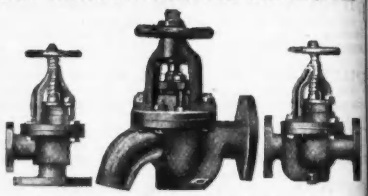

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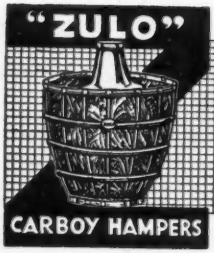

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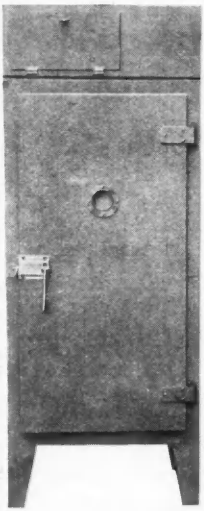

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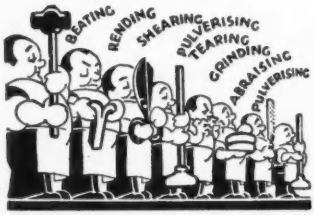

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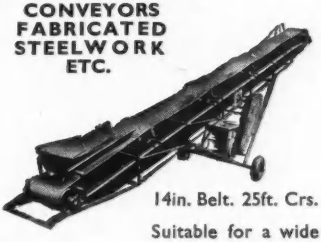

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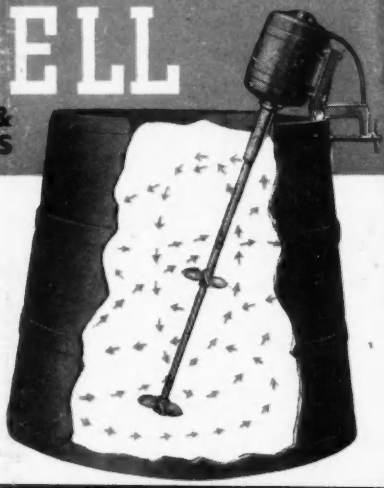

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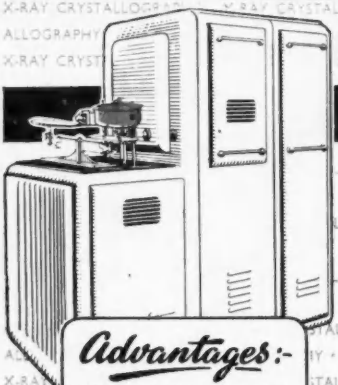

Chemical Analysis

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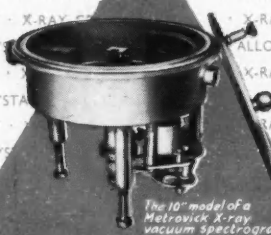

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